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WILLIS

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in Anatomy of the Brain and Description of Nerves

WILLIS, T.

Practice of physick. 1684.

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A

Medical-Philosophical Discourse

OF

FERMENTATION.

OR, OF THE

Intestine Motion

OF

PARTICLES

IN EVERY

BODY.

BY

Dr. *THOMAS WILLIS* of Christ-Church in *Oxford*, and *Sidley* Professor of Natural Philosophy in that Famous University.

Translated into *English*, by *S. P.*

LONDON:

Printed by *H. Clark*, for *T. Dring*, *C. Harper*, and *J. Leigh*.

MDCLXXXIV.

BODY

TO THE

Most Reverend Father in Christ,

And the Right Honourable

HIS GRACE,

GILBERT,

By Divine Providence,

Arch-Bishop of CANTERBURY;

Primate and Metropolitan of all *England*, and one of His Majesties most Honourable Privy-Councellors.

Most Holy Prelate,

THE Eagle will not acknowledge his suspected Chicken, by one only sign; for it is not enough that it can look against the Light, unless it be able also to behold the Sun's Beams without Winking: and indeed although this our hasty Issue, whether by the help of its own blindness, or of that doubtful Light in which it liv'd, hath been able to come abroad, yet it hath not sufficiently given Marks of its true Race, until it might delight its Eye with your Brightness, as at the Sun's Beams.

These Meditations or Discourses, though several times published, now therefore at length boast, that they are able to shew themselves to the Light first, with your Sacred Name in the Front, it is then but reason, that the same *Mecænas*, who hath brought me forth into the open light, from my own darkness, and

from the Filthineſs and Soot in which I was involved, being condemned among the Metals; ſhould think not it any detraction, to lend to my Works Ornament and Splendor, as well as to the Author and Publiſher.

It was by your means (moſt Noble Prelate) that I obtained the Votes in this Famous Univerſity for the Place of *Sidly Profeſſor*; for how ſmall ſoever my Merits might ſeem, they were helped by the Greatneſs and Weight of your Opinion.

I am exceeding conſcious to my ſelf, how unfit, being deſtitute of all help, I came to that Province, both for the Dignity of the Place, of the Univerſity, and of my *Mecænas*, yet I believe nothing is to be deſpair'd of, under ſo great Auſpicies. I would therefore, if there be any thing, at any time, more happily thought of, in the Scrutiny of Nature; and brought forth by me, that it be not referred to my Ingenuity, or (which I might perhaps more truly deſerve) my Induſtry, but to the Influences of my Patron: For to him only he Dedicates and Conſecrates himſelf and all his, who is

Your Graces moſt Humble

And for ever Obliged Servant,

T. W.

TO THE

RIGHT WORSHIPFUL

Sr Theophilus Biddulph,

KNIGHT and BARONET.

Honoured Sir,

I *Have presumed to Dedicate these my* Labours *to you, being the* Translation *of a most Worthy and Learned Author,* Dr. Thomas Willis *his Works, out of the* Latine, *into our* Mother Tongue, *for the benefit of my* Country-men: *and knowing you have always been a general, and generous* Patriot, *a lover of your* Country, *and of all manner of* Industry *and* Ingenuity, *I question not, but you will kindly receive this my* Dedication; *though not for my sake, yet for the many* admirable things *that may be found in the* Book *it self, and for the Good and Benefit, which this my* Laborious Task *may bring to the* Publick. *As I doubt not of your innate Goodness, having already had some particular Experience thereof, so I shall no ways fear an unkind Reception: And although I launch not into the Sea of your Praises, as is the late Custom of* Dedicators *to do, I am perswaded, that this my plain* Epistle *will be as kindly accepted; for I know you to be so modest a Man, as not to love to see all your good Actions, Virtues and Worth, Rhetorically painted and laid open before your Eyes: for as your Worth is too well known, this way to receive any addition; so the praise thereof being needless, will rather cause you to blush, than be any ways pleas'd. But yet I cannot forbear to take notice to the World, that your whole Life has been a true Pattern of* Loyalty *and* Religion, *which in these Troublesome and Distracted Times,*

may be worthily related and mentioned, as a praiſe-worthy Example for others to imitate and follow: and that you are both a true lover of the Church of England, *your* King, *and* Country, *which you have eminently ſhew'd in all your Actions, and manifeſted to the World, by your ſeveral Publick Employs, in the behalf of your* Country, *and of the Renowned City of* London, *of which you are a moſt worthy Member. And no doubt, but that it is for this, your ſtedfaſtneſs in* Religion, *your Loyalty to your* Prince, *your Love to your* Country, *and your uprightneſs in your* Dealings, *that God hath ſhowered on you all manner of external Bleſſings, giving you a fair Eſtate, through your own Induſtry, Wiſdom, and Prudence; a Virtuous Conſort, and a proſperous Iſſue, the fair and flouriſhing Branches of your Ancient Stock and Family: To all which outward Felicities, I ſhall pray, That God may alſo indue your noble Soul with the Celeſtial and Eternal Bleſſings and Treaſures of the World to come, and that you may be conſtantly happy both here and hereafter. I remain,*

Honoured Sir,

Your moſt humble

and faithful Servant,

S. PORDAGE.

THE

THE PREFACE.

THE ſame thing happens to me, about to ſpeak of Fermentation, that once did to a Famous Hiſtorian, when he wrote his Commentary of the *Roman* Empire, to wit, whilſt he endeavoured to draw forth, as it were in a little Table, the Affairs only of that Nation, he was neceſſitated not only to recount the Actions of one People, but of all Man-kind: In like manner, whilſt I did meditate on a few things only concerning the Energy, and the Means of the working of Ferments, I have brought into this Tract, as it were ſwelled up with a certain Ferment, the whole Proviſion, and Dowry of all Nature. Entring upon this Diſquiſition, I thought I had been tyed only to the Bakers Oven, and Brewers Furnace, being condemned to the Mill, not to have proceeded beyond their limits, unleſs by chance, or with leave; but after that I had begun to look more deeply into the matter, I perceived I had gotten a far more large Province: Becauſe it plainly appeared, beſides theſe of Art, very many Works of Nature, to be not only like, but themſelves the effects of Fermentation: For when, for the ſolving of the *Phænomena's*, which are met with about the ſwelling up of the mealy Maſs, and the working of Wine, and of other Liquors, I had Compoſed divers Arguments, Reaſons, and Hypotheſes, I found at length, thoſe firſt begotten Particles, by whoſe Orgaſm or Heat, thoſe vulgar preparations do Ferment, to beget the Cauſes of Motions, and Alterations, in whatever things they are mix'd with beſides; wherefore, I may be pardoned, if I have ſtrayed far from our Propoſition, and have ſeemed to any one, to have heaped together here, too plentiful an Harveſt of Matter, becauſe I was wholly led by the ſame thrid of

Ratio-

Ratiocination, and the moſt conjunct Affinity of things, to theſe various and diverſe Concretes. If any one ſhall object, that I proſtitute the unuſual Notions, and almoſt only heard of, in the Shops of the Chymiſts, unhandſomly among the works of ordinary people, I ſay, theſe Principles, which being brought indeed to perform the ſelf moving motions of Natural things, alſo more eaſily to repreſent them to the vulgar capacity, and lay them not only before their Eyes, but even into their very Hands; what of theſe kind of ſubſtances, I call Particles, Men, tho' rude and unskilful, may perceive even by the help of their ſenſes to be in the things: beſides the names of Sulphur, Salt, and Spirit, and the reſt, are more familiarly known, than Matter, and Form, or the four Principles of the *Peripateticks*. As to our Method, and Manner of Philoſophizing, no Man can blame me, if I ſhould not here deſcribe all things according to Rule, and Analytick Patterns; becauſe in this Work, it chances for me to wander, without a Guide, or Companion, in ſolitary places, and as it were in a ſolitude trodden by no footſteps, where I not only make a Journey, but my way alſo: therefore, whenever I deviate, I cannot be ſaid to err, among right Judges of our endeavonrs, who have no Path in which I ſhould Walk, nor could find a Track, which I might fear to miſs.

ON

The Table.

Since nothing could so well expreſs the meaning and intention of the Author, as the very *Latin* and *Greek* Words uſed in theſe Tracts, we have continued them expreſly, and though in many Places I have given their meaning by *Synonyma's*, yet for the benefit of meer *Engliſh* Readers, we have here compoſed a Table Alphabetically of all the hard *Greek* and *Latin* Words, uſed in the whole Volume; as alſo of all Terms of Art, and many other Words derived from the *Latin.* and *Greek*, tho' uſual among Scholars, yet not frequently known to the vulgar, and therefore we have fully explained them, andrendred them intelligible to the meaneſt Capacity in the following Table.

A TABLE of all the hard words derived from the *Greek* and *Latin*, of all Terms of Art and other words not vulgarly received, with the Explanation of them.

A

ABdomen, *The lower part of the Belly from the Navel downwards.*
Ablution, *A waſhing away.*
Accenſion, *An Inkindling.*
Acceſſion, *A coming to or approach.*
Acme, *The height or top of a thing.*
Acid, *Sharp.*
Acidity, *Sharpneſs.*
Acidulæ, *Medicinal waters running forth from Veins of Iron, Copper, and ſuch like, called* Spaws *from that famous place for Mineral-waters, the* Spaw *in* Germany.
Acrimony, *Sharpneſs or ſourneſs rather.*
Actionobolism, *An Irradiation of Beams, or ſhooting forth of the ſpirits like beams of the Sun.*
Aconite, *A venomous poiſonus Herb put for* Libbards *bane*
Acute, *Sharp, or exceſſive painful, or that is quick and dangerous.*
Aculeated, *Made ſharp and prickly like a Needles point.*
Adhæſion, *A ſticking to.*
Adjuted, *Helped.*
Adventitious, *Coming by accident, or by the by.*
Aduſt, *Burnt or parch'd.*
Aduſtion, *A burning or parching.*
Æquilibrium, *An equal or even poiſe when the Balance ſtands bending neither to the one ſide or the other.*
Æquinox, *When the Sun is in the Equinoctial Line and divides the Day and Night into an equal length, and is about the* 12. *of* March *and about the* 12. *of* September.
Ætherial, *Heavenly or belonging to the Air or Skie.*
Ætiology, *The rendring of the Cauſe or Reaſon of a thing.*
Affection, *Taken for the natural Condition, and often ſignifies ſickneſs or diſeaſe.*
Affected, *Diſtempered or diſeaſed. Sometimes natural diſturbance.*
Affuſion, *A pouring forth of any thing.*
Agaric, *A Drug that purges Phlegm.*
Aggeſtion, *A heaping together of any thing.*
Agitated, *A violent ſhaking or jogging together.*
Alembic, *An* Arabic *word for a Still uſed by Chymiſts.*
Alexipharmaca, *Medicines againſt Poiſons and venom.*
Alexiterion, *The ſame, being an Antidote againſt Poiſon.*
Alchaliſat, *A ſalt made of the herb* Kali. *Alſo taken and applyed to ſalts made of Herbs and ſhells of Fiſhes.*
Alible. *Nouriſhable, or that nouriſhes.*
Aliment, *Food.*
Alliſion, *A ſtriking or knocking together.*
Aloes, *A juice made out of a bitter herb uſed in purging Medicines, alſo a ſweet wood.*
Amalgama, *A Chymical Term for the ſetling and mixture of ſeveral Minerals or Metals, or other things whereby a ſeparation and extraction may be made.*
Ambages, *A compaſſing or going about.*
Ambient, *That invirons or compaſſes one about as the Air.*
Amulets, Pomanders *or* Bracelets *made againſt Witchcraft, and Infection and Poiſon.*
Analogy, *Proportion, or agreement or likeneſs.*
Analaſis, *The laying open or unfolding of the matter.*
Anatomy, *A diſſecting the Body, to ſee the ſeveral parts.*
Anaſarca, *The watry Dropſie ſwelling up the whole fleſh.*
Analeſia, *A ſtupifying diſeaſe that takes away the ſenſe from all parts of the Head.*
Angle, *A Mathematical Term, being the nook or ſpace at the cutting of two lines, and is of ſeveral ſorts. A Corner or nook.*

Anhelous, *Short-winded, or that puffeth for want of breath; that breatheth difficultly.*

Annulary, Annular, } *Ringy, or like Rings.*

Anodynes, *Medicines procuring eaſe from pains by ſleep or other means.*

Anomal, *Irregular, out of order.*

Antaſthmaticks, *Things good againſt the Cough or* Aſthma.

Anterior, *The former.*

Antidote, *A Medecine againſt Poyſon or any other diſeaſe.*

Anticipate, *To go before.*

Antihypnotics, *Medecines given againſt too much ſleeping.*

Antipyreuticon, *A Medecine againſt a Feaver, or a Feaver-Curer.*

Antipyreticks, *Medecines againſt burning Feavers.*

Antiſpaſmodicks, *Medecines againſt Convulſions.*

Anus, *The Fundament or Arſe-hole.*

Aorta, *The great Artery the mother of all the reſt, proceeding from the Heart, one branch aſcending, another deſcending.*

Apoplectic, *One ſubject to the Apoplexy.*

Apoplexy, *A diſeaſe that ſtupifies and takes away ſenſe and motion.*

Apozems, *Decoctions or drinking medecines made with herbs.*

Appendixes, *Things belonging or depending on another, as the parts about the heart.*

Aquoſity, *Wateriſhneſs.*

Area, *The void ſpace in a Figure, as a Triangle or Quadrangle: The Plat or Floor of any thing.*

Armoniac, *Salt extracted out of ſtones.*

Arteries, *The Veſſels that carry the blood to the heart.*

Arthritick, *Gouty or belonging to the Gout.*

Arſnick, *Or Orpiment, a poiſonous drug.*

Archeus, *A cheif officer, Workman, or Operator.*

Articulation, *A ſhooting of ſpriggs from the joynts.*

Aſcites, *A kind of Dropſie which ſwells between the skin and the fleſh.*

Aſper, *Sharp, Aſper artery, the wind-pipe.*

Aſſimulation, *A growing or making like.*

Aſſimulate, *To grow or make like.*

Aſthma, *A troubleſome diſeaſe, when the lungs being ſtopped, one cannot take breath.*

Aſthmatical, *Belonging to that diſeaſe, or troubled with it.*

Aſtringent, *Binding.*

Ataxias, *Diſorders, irregularities.*

Atoms, *Small little Bodies, ſuch as motes in the Sun-ſhine.*

Atrabilous, Atrabilary, } *Belonging to the black Bile or melancholy or to the melancholy humour.*

Atrophy, *A diſeaſe cauſing a pining away, or a waſting, or Conſumption of the fleſh.*

Attrition, *A knocking, or bruiſing, or rubbing together.*

Auditory, *An Aſſembly, or thoſe who hear.*

Aurum fulminans, *Or thundering Gold, a metal prepared by Chymical Art, that being heated goes off like a Gun with a Thundering noiſe.*

Auſtere, *Biting, harſh.*

Axillarie, { Vein *is a branch of the* Vena Cava *coming thorough the arm-hole from the chanel bone deſcends into the inſide of the arm.* / Artery *ſprings from the left ſide of the* Aorta *above the heart, and aſcending obliquely thorow the arm-holes, and thence ſending branches into the upper ribs, ſhoulder and chanel bone, it deſcends down to the bowing of the Elbow.*

Azygos vein, *is a branch of the upper Trunck of the* Vena Cava, *ariſing on the right ſide.*

B

Balneum Mariæ, *Is a way of diſtilling with a Glaſs-belly, holding the Ingredients put into a Veſſel of water, and ſo fire being made under it, it diſtills with the heat of the water.*

Balſamic, *Balſamie or belonging to Balſam.*

Baſilick Vein, *A large Vein into which the* Axillarie *vein is carried, called alſo the* Liver vein.

Baſis, *The foundation or foot of a thing.*

Bechicks, *Medecines againſt the Cough.*

Belly, { *Upper, the head ſo called.* / *Middle, the region of the ſtomach.* / *Lower, The parts below the Midriff, containing the Inteſtines.*

Bezoartick, *Belonging or made of the precious ſtone* Bezoar.

Bezoar, *A precious ſtone brought out of the* Indies *very* Cordial.

Bile, *Choler.*

Bilary, *Belonging to Bile or Choler, ſometimes applyed to the veſſel containing the Choler.*

Bipartite, *Divided into two parts.*

Bolus, *Is a Medecine made up into a thick ſubſtance to be ſwallow'd not liquid, but taken on a Knives point.*

Botonick, *Pertaining to herbs or herby.*

Brachial, *Belonging to the Arm.*

Bronchia, *The griſly parts about the wind-pipe*

Buboes, *Filthy ſwellings about the groin.*

C

Cachexia, *An evil diſpoſition of the Body when all the nutriment turns into evil humours.*

Cachectical, *To ſuch evil ſtate or diſpoſition be-*

belonging, or one troubled with such evil disposition.

Cachochymical, *Full of evil and bad juice in the body, of very ill digestion.*

Callous, *Hard, fleshy and brawny.*

Calx, *Ashes, Lime, sometime taken for the remaining parts of things Chymically drawn off.*

Capillaments, *Small hairy threds of the Nerves.*

Caput mortuum, *The dead head, being the last thing remaining after several Chymical extractions and good for nothing but to be flung away, all virtue being extracted.*

Carbuncle, *A red fiery sore; a Plague-sore.*

Cardiack, *Cordial, or belonging to the Heart.*

Carotides, *Two arteries which arising out of the Axillarie Artery, are carried thorow the side of the Neck upwards into the skull.*

Carthamums, *A little seed used in Medecines.*

Caruncles, *Little peices of flesh.*

Cartilage, *Is a gristle or tendril, a substance somewhat softer than a bone, and harder than a Ligament.*

Cartilaginous, *Gristly, or belonging to, or full of such gristles.*

Cassia, *A sweet shrub like Cinamon, also a drug that purgeth.*

Cataplasm, *A Poultis or asswaging Plaister.*

Catarrh, *A great Rheum falling from the head into the mouth.*

Cathartic, *A purging Medecine.*

Cava vena, *The great Liver-vein going thorow the Body.*

Cavity, *Hollowness.*

Caustic, } *A Composition made to burn a hole in*
Cautery, } *the skin and flesh to make Issues.*

Celiac vessels, *Vessels belonging to the Belly.*

Celebrated, *Performed or done.*

Cephalalge, *The Head-ach.*

Cephalic, *Belonging to the head, a Medecine proper for the head.*

Cephalic-vein, *Which springing out of the Axillary vein, passes between the first and second muscle of the shoulder, and so passes evidently into the Arm.*

Cephalic Artery, *Consists of two branches which springeth out of the great Artery, ascend up into the head.*

Cerebel, *The hinder part of the Brain from whence the Nerves proceed that serve to the vital function.*

Cervical, *Belonging to the Neck.*

Chalybeat, *A Medecine made of prepared Steel, or belonging to Steel.*

Characteristical, *The notes, signs or figures belonging to a Character.*

Chlorosis, *The Green-sickness, or the virgins disease.*

Choleduc vessels, *The vessels that hold and send forth the Gall.*

Chorodeidal, *Belonging to the Net, like to the infoldings about the Brain.*

Chyle, *Is the juice or substance of of the meat digested.*

Chylification, *The making of Chyle.*

Chyme, *Is the juice of the meat further digested.*

Chronical, *Long and tedious diseases.*

Circumpulsion, *A driving about.*

Classes, *Forms or Orders.*

Coalition, *Nourishment.*

Coagulation, *A curdling like milk, a turning into a Curd, or a separation of the parts like Curds and Whey.*

Coagulum, *Any thing that causeth such a curdling, as Rennet.*

Coagulated, *Curdled.*

Coction, *Boiling or seething, also digestion.*

Cohobation, *A dreyning or pouring off from a settlement.*

Coindications, *Things to be considered with the disease, also signs besides the disease it self.*

Colcothar, *Dross of mettals.*

Colical, *Belonging to the disease called the Colick.*

Colliquation, *A melting together.*

Collation, *A comparing or coupling together.*

Collated, *Compared or Coupled together.*

Collision, *A striking or knocking together.*

Colocynthida, *Or Coloquintida, a bitter purging Gourd or Apple.*

Colon, *The fifth Gut, or that great Gut in which is seated the disease called the Colick.*

Colluvies, *A filthy heap of any thing.*

Commissures, *The joynting or joyning of things together, as of the skull bones.*

Complication, *A folding together.*

Conarium, *A Kernel sticking to the outside of the Brain in form of a Pine-apple.*

Concatenation, *A chaining or joyning together.*

Concatenated, *Joyned, tyed, or fastned together.*

Conflagration, *A burning out, or being in a flame, as in Great Feavers.*

Conformation, *The framing, fashioning or disposition of a thing.*

Congelation, *A Freezing or gathering together into an hard substance, as Ice of water.*

Congeled, *Frozen, stifned.*

Congestion, *An heaping or gathering together.*

Conjugation, *A yoking together, a derivation of things of one kind.*

Consistency, *Thickness or substance, as a Jelly.*

Convolutions, *Roulings about or together, a twisting together.*

Contexture, *A weaving together, or a framing or composition.*

Copula, *A Joyning or fastning together, fettering.*

Corollary, *Addition, vantage, overplus.*

Corrosive, *Gnawing, eating, corroding.*

Corrugations, *Wrinkling together.*

Cortex, *The bark, shell, peel, or rind.*

Cortical, *Belonging to the bark, or rind, or peel of a thing*

Crasis, *The disposition, complexion, temperature or mixture of natural humours.*

Crass, *Thick.*

Crassament, *A thickness or thick setling, as of dregs.*

Cribrious, *Sivelike, or that hath holes like a ſieve.*
Crude, *Raw, undigeſted.*
Crudities, *Raw and undigeſted humours, or rawneſs, or undigeſtion of any thing.*
Criſis. *Is the time of the turn of the diſeaſe when it either increaſes or diminiſhes, always obſerved by the Phyſitians.*
Critical, *To the Criſis, or ſuch time belonging.*
Cremaſteral, *Muſcles belonging to the Teſticles.*
Crural, *belonging to the Leg.*
Crucible, *An earthen veſſel uſed to melt Metal with.*
Cucurbite, *A Glaſs-body with a great Belly, uſed in diſtillations.*
Cuneform, *Wedge-like or in form of a Wedge: A bone ſo ſhap'd.*
Cutaneous, *Belonging to the skin, or skinny.*
Culinarie, *Belonging to the Kitchin.*
Cuticula, *The little thin skin under the Cutis or the upper skin.*
Cutis, *The upper or outward skin of the Body.*

D

Dead head, *The ſame with* Caput mortuum.
Decapulation, *A pouring off.*
Defection, *A failing, weakneſs or infirmity.*
Decoction, *A boyling or ſeething.*
Defecated, *made free from dregs.*
Deflagration, *A flaming or burning forth.*
Diliquium, *As of the ſalt of* Tartar, *a clear draining, alſo a ſwooning away, or a failing of the ſenſes.*
Dilirium, *A raving madneſs, as in Feavers.*
Deltoides, *A muſcle in the top of the Arm, having the figure of a* Delta, *the* Greek *D.*
Demerſed, *Drowned.*
Depauperated, *Made poor or waſted.*
Depraved, *Corrupted or marred.*
Depurated, *Cleanſed from dregs.*
Depuration, *A cleanſing or making pure.*
Deſultory, *Leaping, wavering or inconſtant.*
Diabetes, *The Piſſing evil; a diſeaſe that cauſeth the party troubled therewith almoſt continually to piſs, and in a great quantity a clear and ſweetiſh water.*
Diocodium, *A Syrup to procure ſleep, made of the tops of* Poppy.
Diagnoſis, *Dilucidation, or Knowledge.*
Diagridium, *See* Scammony.
Diaphoreſis, *Evaporation, as by ſweating.*
Diaphoretic, *That cauſeth Evaporation or ſweating forth of humours.*
Diaphanous, *Clear and ſplendid.*
Diaphragma, *The Midriff that ſeparateth the Heart and Lights from the ſtomach.*
Diopneon, Diapnoe, *A breathing forth.*
Diarrhæa, *A looſneſs of the Belly, without inflammation, a Lask.*
Diaſcordium, *A Cordial medicine made of* Scordium *and other Ingredients.*
Diaſtole, *The riſing up of the Heart or Artery, the contrary motion of Syſtole.*
Diatheſis, *The affection or diſpoſition.*
Diluted, *Rinſed or waſhed.*
Dilucidation, *An explaining or clearing.*
Dioptric, *Belonging to the Perſpective, or a Mathematical Inſtrument, thorough which they look to take the height of a thing.*
Divarications, *A varying or ſevering into parts running up and down, as the Veins and Nerves.*
Diverſory, *A diverting place, or a place to turn of one ſide out of the way.*
Diureſis, *Evacuation by Urine.*
Diuretick, *A Medecine that cauſeth evacuation by Urine.*
Dogmatic, *Stiff in Opinion.*
Duodenum, *The firſt Gut or Inteſtine of twelve fingers long.*
Dura mater, *The hard membrane or tunicle that encompaſſeth the brain next the skull.*
Dyſcraſie, *Intemperature, as ſome humour or quality abounding in the Body.*
Dyſentery, *A flux of the Belly that corrodes the Bowels and often cauſeth blood, called then the* Bloudy flux.
Dyſpathy, *A contrariety of affection.*
Dyſpnœa, *A purſineſs or ſhortneſs of breathing, and a ſtopping of the Conduits of the Lights.*

E

Ebullition, *A boiling up.*
Eccentric, *Without Centre.*
Eccathartic, *Not purging.*
Eccritic, *Not critical.*
Edulcorated. *Made ſweet.*
Effervency, Efferveſcency, *A being very hot or inflamed.*
Effluvia, *Things that flow out of the Body, as ſteam and breath thorough the pores of the skin.*
Egeſtion, *A caſting forth as ordure from the body, or any excrementitious humour.*
Egritude, *Sickneſs or not being well.*
Elaſtick, *That goeth off with a force like Gunpowder, or ſpreads forcibly forth with a jerk.*
Elaterium, *A violent ſtrong purging Medicine.*
Elixation, *A boyling.*
Elixir, *An* Arabian *word for Quinteſſence, high Cordials ſo called.*
Elogy, *A report in praiſe or diſpraiſe of a thing.*
Emanations, *Things that flow or proceed from the Body or its parts; flowing forth.*
Embryo, *The Child before it hath perfect ſhape in the mothers womb.*
Emiſſaries, *Places that ſend forth any thing as the ſinks of the body.*
Empirical, *Belonging to an Empirick or of knowledge in Phyſick, got by practice only.*
Empiric, *Such a Phyſitian who hath no Judgment, but has all his skill from practice, or by experiments.*

Empyema, *An Impost hume or collection of corrupt matter with inflammation between the breast and the Lungs.*

Empyreuma, *A smatch or taste of the fire, as burnt too, or as in most waters newly drawn off by distillation.*

Emulgent, Emulging, *Vessels or Arteries, or veins: two large Arteries so called springing out of the great Artery, which being carried near to the back bone are inserted into the Reins. Also two large Veins which springing out of the* Vena Cava *under the Ventricle, are carried into the Kidnies.*

Emunctories, *Sinks or cleansing places for the Body.*

Encephalon, *The head and all its parts.*

Enema, *A Clister.*

Energy, *The force or operation, or virtue of a thing.*

Enervation, *Unnerving, or a loosing of the strength, a weakning or making feeble.*

Enthymiama, Enthymeta, *Medecines used to express the flowing of the Blood or other humours to any place.*

Ephemera, *Things of a days lasting: A short Feaver of a day.*

Epidemical, *General, universal, publick.*

Ephidorsis, *A sudden sweat beginning about the head and breast passing over the body, unprofitable and of small use for that evacuation of the disease: Sometimes taken for sweating.*

Epigastric, *Belonging to the* Epigastrium.

Epigastrium, *The same with* Abdomen, *or the outward part of the Belly, from the Navel to the privy members.*

Epilepsie, *The Disease called the* Falling-sickness.

Epiphysis, *Is an addition of some bone of a different description to the true bone to which it is annexed: an addition or augmentation.*

Epispasticks, *Certain Medecines used for the drawing forth of ulcerous matter.*

Epithema, *Moist Medecines used to bathe or foment the parts affected.*

Epithymum, Dodder of Time, *used to purge Melancholy.*

Equinox, *When the day and night are of an equal length, about the twelfth of* March, *and the twelfth of* September.

Eradicated, *Rooted out.*

Erratic, *Creeping, wandring, or straying.*

Escharotic, *A Plaister or Salve to heal up a wound, and to bring it to a Crust.*

Etymology, *The true Exposition or interpretation of a thing.*

Evident, *Plain, clear, manifest.*

Eventilated, *Fannowed, or that receives wind.*

Euphorbium, *The Gum of a certain Tree so called.*

Excandescency, *A growing very hot and burning.*

Excern, *Thrust out, to purge, or sift forth.*

Excrementitious, *Belonging to Excrements: filthy, polluted.*

Excretion, *A voiding the Excrements, or superfluities of the body.*

Excretory, *To such a thing belonging, that puts forth the Excrements of the body.*

Excrescencies, *Things that grow forth out of the body, or any other thing besides the body, or thing, as Warts or pieces of flesh.*

Exert, *To shew or put forth.*

Exitition, *A sparkling, boiling, bubling, or leaping up, or forth.*

Exonerate, *To disburden, or discharge, to purge forth.*

Expansion, *A stretching forth, spreading abroad, or inlarging.*

Expansed, *Spread out at large, or stretched forth.*

Expatiated, *A running forth or about, enlarged.*

Explosion, *A driving forth with violence.*

Exploded, *Thrust forth, or driven out.*

Extravasated, *Put, or let forth of the Vessels as Blood out of the veins.*

Extraneous, *Strange, or of another kind.*

Extirpated, *Rooted out, or plucked up by the Roots.*

Extricated, *Delivered, or unintangled.*

Exuberances, *Swellings forth, or risings up, in the flesh or other parts.*

F

Fæces, *Dregs.*

Fæculencies, *Dregs or settlements.*

Farciments, *Stuffing or fillings of any thing.*

Fermentation, *A fermenting or working, like leaven.*

Fibrils, *Little small strings of Fibres, or of the Nerves or Veins.*

Fibres, *The hairy strings of the Nerves and Veins.*

Fibrated, *That has small and hairy strings.*

Filaments, *Little, thin, slender Rags like threds, such as appear in Urine.*

Filter, *To strain: A Strainer.*

Fissures, *Clefts, chaps, or divisions.*

Fistulous, *Belonging to a Fistula, or sore running Boil.*

Flatulent, Flatuous, *Windy or full of Wind.*

Fluor, *A Flux.*

Fluid, *Flowing or running.*

Fluidity, *Apt to flow, flowing or wetness.*

Fornix, *An hollow place in the Brain, bending like an Arch.*

Forum, *A place in* Rome *where Judgments were given, and causes decided.*

Friable, *That may be rubb'd to pouder between the Fingers.*

Frictions, *Rubbings.*

Fuliginous, *Sooty, or belonging to Soot.*

Functions, *The Exerciſes or diſcharging of ſome Offices.*
Fuſe, *To melt as Mettals.*
Fuſed, *Melted or running, as Mettals made liquid.*
Fuſion, *A pouring forth, alſo a melting of Metals or other things.*

G

Ganglia, *Things like the heads of* Muſhrumps *in the body.*
Ganglioform, *Of the ſhape of* Ganglias, *or the heads of* Muſhrumps.
Galen, *An ancient learned Phyſitian.*
Gargariſms, *Medecines to cleanſe the mouth and Throat, and to waſh them from filth.*
Geneſis, *Beginning, Nativity, or Generation,*
Genuine, *True or natural.*
Germination, *A ſpringing or budding, or ſprouting forth, as of Trees in the ſpring.*
Geſticulation, *A wanton moving up and down of the Legs and Arms or other parts of the body, like a Tumbler or Mimick.*
Glandulas, *Are little round Kernels every where up and down in the fleſh and other parts.*
Glutæi, *Muſcles of the Thigh.*
Gonorrhea, *The running of the Reins, a flux of ſeed or matter at the privy parts of man or woman.*
Grumous, *Clottery like blood when congealed.*

H

Hæmorrage, *An exceſſive flux of Blood at the noſe or elſewhere.*
Halos, *A Circle about the moon or ſtars.*
Hellebore, *The root of an herb uſed in Phyſick, two ſorts, white and black.*
Heptic, *Belonging to the Liver, and a Medecine proper to cure the diſeaſes of the Liver.*
Hermodactils, *Or Mercuries finger, white and red, uſed in Medecines.*
Heterogeneous, *Of an other kind or Genus, ſtrange, not agreeing.*
Homogeneous, *of the ſame kind or Genus, agreeable, and ſorting.*
Horizon, *The Circle of the Firmament, terminating our ſight.*
Humid, *Moiſt, wet.*
Hydropic, *That hath the Dropſie, or belonging to the Dropſie.*
Hydrotic, *A medicine evacuating watery humours.*
Hydragogues, *Medecines that will draw forth the watery humour of thoſe who have the Dropſie.*
Hyoeides, *A forked bone like the letter* Y, *ſo called of the* Anatomiſts, *conſiſting of divers ſmall bones which are the ground or foundation of the muſcles of the* Larynx, *and the Tongue, and helps to breathing, and ſwallowing down meat and drink.*
Hypercatharſis, *Overpurging, or in extreme.*
Hypochondria, *The* Præcordia: *The forepart of of the Belly and ſides about the ſhort Ribs and above the Navel, under which lyeth the Liver & the ſpleen.*
Hypochondriac, *A windy Melancholy, bred in the* Hypochondria, *from whence a black phlegm ariſes that infects and troubles the mind, one troubled with ſuch melancholy.*
Hypnotic, *A medecine that cauſeth ſleep.*
Hypogaſtrium, *The lower part of the Belly, which reaches from the Navel downwards to the privy parts.*
Hippocrates, *A learned ancient Phyſitian, and the firſt methodizer of Phyſick, and made it Artificial.*
Hippocrates ſleeve, *A long woollen ſtraining bag, ſharp at the bottom, ſo called, being almoſt in faſhion of a ſleeve or Doublet.*
Hypotheſis, *An argument or matter about which one may diſpute.*
Hypoſtaſis, *A ſubſtance or ſettlement, ſuch as is in the bottom of an Urin.*
Hyſterical, *Belonging to the womb or mother, or troubled with the diſeaſe called the* Mother.

I

Jalap, *A purging Drug.*
Ichor, *The matter or corruption running forth of a ſore or Ulcer.*
Idocraſie, *The proper diſpoſition or temperament of a thing or body.*
Idioſyncraſie, *The property of the Temperament of Bodies.*
Idiopathic, *Belonging to the proper paſſion of a diſeaſe, thing or body.*
Idiopathy, *The proper paſſion of a diſeaſe.*
Idea, *The form or figure of a thing conceived in the Imagination.*
Ilion, *The third Gut from the Ventricle, wherein the digeſted food or Chyle waxing thicker begins to reſt; the thin Gut or ſmall Gut.*
Iliac, *Belonging to the Colick: The Colick in extremity. Iliack paſſion.*
Imbecillity, *Weakneſs, feebleneſs.*
Impervious, *That cannot be paſſed or gone thorow.*
Impetigo, *A certain kind of dry Itch or ſcurf like the Leproſie.*
Impetuous, *Violently or with force, as it were ruſhing upon a thing.*
Impregnated, *Filled full with the vertue of a thing, as when any thing is infuſed in a liquid body, communicating its vertue to it.*
Inanition, *Emptineſs.*
Incitement *A ſtirring up or provoking.*
Indication, *A ſhewing or manifeſting by ſign.*
Indomitable, *Untamable, that cannot be ſubdued.*
Inflated, *Blown or puffed up as a Bladder with wind.*

In-

Ingeſtion, *A putting or pouring into a thing, as meat and drink into the ſtomach.*
Inguinal, *belonging to the Groin.*
Inordination, *Diſorderings, irregularities, or out of order.*
Inſipid, *Without taſte or ſmack.*
Inſpiration, *A Blowing in, or a drawing in of the breath.*
Intenſe, *Strong, Violent, Great.*
Intercoſtals, *Between the Ribs, Nerves, ſo called, becauſe deſcending from the brain, they run between the Ribs, and ſo deſcend to the Inwards.*
Internodia, *Between the joynts or knots, as the ſpaces in a Ratoon Cane between the joynts or knots.*
Interſtitia, *The ſpaces between other diſtances as the ſpaces between the Ribs, or the joyntings of the back-bone.*
Internuncius, *A meſſenger that goes between.*
Inteſtines, *The entrails or the Guts.*
Intrinſical, *Inward.*
Inverſe, *A turning inſide out, or outſide in, upſide down, quite contrary.*
Inverted, *Turned wrong-ſide out or upſide-down; quite changed from its natural ſcituation.*
Involuntary, *Not with the will, unwilling.*
Irradiation, *A beaming forth or caſting forth beams like the Sun. Sometimes applyed to the ſpirits beaming themſelves forth, or running forth from their centre like beams.*
Irrigation, *A watering, wetting or moiſtening.*
Irritate, *To provoke, anger, or ſtir up.*
Irritated, *Provoked, anger'd, or ſtirred up.*
Iſchuria, *The diſeaſe of the Bladder; the ſtoppage of the water, when it cannot come forth but by drops and with pain.*
Iſchuretical, *one ſo troubled with that diſtemper.*
Jugular, *Belonging to the Throat, the throat-vein and Artery.*
Julap, *A cooling Cordial, or a mixed Potion to cool and refreſh the heated ſpirits, uſed in Feavers.*

L

Lactiform, *Like milk, or in the form of milk.*
Languor, *Feebleneſs, failing or decay of ſtrength, fainting, or weakneſs of Spirits.*
Larynx, *The top of the Aſper Artery, or the head thereof, which reacheth up to the Mouth or Jaw, which with the bone* Hyoides *joyned thereto, ſerves for breathing and forming of the voyce, or the air into articulate ſounds.*
Laſſitude, *Wearineſs and irkſomneſs.*
Lateral, *Belonging to the ſide.*
Latex, *Liquor or Juice of any ſort in the body.*
Laudanum, *A Medecine uſed by Phyſicians to cauſe reſt, given in difficult Caſes.*
Lienary, *Belonging to the Spleen.*
Leipothymy, *A ſwooning or fainting away of the ſpirits.*
Lethiferous, *Deadly, that cauſeth death.*
Leucophlegmacy, *The kind of Dropſie that ariſeth of white Phlegm throughout all the body, and makes the fleſh ſpongy.*
Ligature, *A band or ſtring bound hard about the Arm, Leg or any other part of the Body.*
Limature, *The ponder or duſt that cometh of fileing, the fileings of Steel and other mettals.*
Limpid, *Clear, pure, and bright like water.*
Linctus, *A Medecine that is to be lick'd with the Tongue.*
Liniments, *Ointments.*
Lixivial, *Belonging to lie made of aſhes.*
Lobes, *Lappets, or ſuch as the Liver is diſtinguiſhed into.*
Lochia, *All that comes away from a woman after ſhe is brought to bed.*
Locomotive, *That moves from place to place.*
Lucophlegmacy, *See* Leucophlegmacy.
Lumbary, *Belonging to the loyns.*
Luxuriat, *To grow rank or abound.*
Limphic, Limphatic, *Veſſels: That carry or contain the wateriſh humours of the body.*
Limpheducts, *Water-Carriers, or Conveyors, the ſame ſort of Veſſels which carry forth the wateriſh humours.*

M

Magma, *The blended droſs and faces of ſeveral Mettals, as alſo of Chymical Extractions.*
Mammillary, *Proceſſes in the Temples, Bones hanging down like broken brows of Banks repreſenting the faſhion of Teats and Cows Udders.*
Manſorius, Maſſoterie, *A Muſcle, which ſpringing up circularly from the Throat-bone of the upper Jaw, moveth the nether Jaw.*
Mandible, *The Jaw wherein the Teeth are ſet.*
Maſtic, *A certain Medecinal Gum.*
Maſticator, *The Pipe or Conduit that conveys the pituitous matter out of the Head into the Mouth.*
Matrace, *A Veſſel uſed for Chymical Diſtillations.*
Maturation, *A ripening.*
Maxilary, Maxillar, *Belonging to the Jaws.*
Mechoacan, *A purging Drug brought from the* Indies.
Meconium, *The juice of the Leaves and heads of* Poppy.
Medaſtinum, *Or* Mediaſtinum: *The thin membrane that divides the middle belly or the Breaſt, from the Throat to the Midriff into two boſoms or hollows: One on the right ſide, the other on the left.*
Medullar, *Marrowy, or belonging to the marrow or pith, or the white ſubſtance of the Brain.*
Membranes, *The little thin skins joyning the bones and ſinews together in ſeveral parts of the body: The upper thin skins of any part.*
Meninges, *The thin skins that enwrap the Brain,*

both of the pia mater & dura mater: *one called the hard, the other the ſoft Meninx.*

Menſtruum, *A preparation made by Chymiſts to diſſolve metals, alſo to extract tinctures and the virtues of medecinal druggs, woods, flowers, herbs,* &c.

Meſentery, *A certain thick fat skin, or the double skin that faſtens the bowels to the back, and each to other.*

Meſeraic, *Veins ariſe, or are rather incloſed in the* Meſentery, *being branches of the great vein, by which the Guts are nouriſhed, and the juice of the meat concocted, is conveyed to the Liver to be made blood.*

Mercurie, *Quick-ſilver, and its preparations of it.*

Metaphyſical, *Supernatural; things of ſublime ſpeculations beyond nature.*

Metaſtaſis, *Is a tranſlation, or when a diſeaſe removes out of one place into another.*

Metatheſis, *Is tranpoſing, the putting of one thing for another.*

Miaſm, *Infection or taint.*

Microſcope, *A Perpective-glaſs to behold minute, and very ſmall bodies, a Magnifying glaſs.*

Millepedes, *The hundred-feeted Creature, and Heſlog-ſows, or Hog-lice.*

Mirabolans, *A certain medecinal fruit brought out of the* Indies.

Modifications, *A meaſuring or bringing into meaſure.*

Morbid, } *Sick, corrupt, filthy, or naughty.*
Morbifick, } *That cauſeth the Sickneſs or diſeaſe.*

Mucilage, *Thick boiling up of a thing to a jelly, or thick conſiſtency.*

Munited, *Defended or fortified.*

Muſcle, *Parts of the body that ſerve for motion, ſofter, and more fleſhly than the ſinews.*

Muſculous, *Full of Muſcles, or belonging to the Muſcles.*

Myology, *The Doctrine of the Muſcles.*

N

Narcotick, *Stupifactive, or that makes the part ſenſleſs.*

Nates, *Two prominences in the Brain, ſo called becauſe in the form of Buttocks.*

Natiform, *In the form of a Buttock.*

Neoterics, *People or men of late Times.*

Nepenthe, *A drink to drive away melancholy.*

Nephritis, *A pain in the reins of the back, alſo the Stone or Gravel in the Reins.*

Nephritic, *One troubled with the pain in the Reins.*

Nerves, *Are the ſinews which convey the ſpirits that ſerve for life and motion through the whole body.*

Neurologie, *The doctrine of the Nerves.*

Nitre, *That is uſually called Saltpetre: A ſalt taken out of the earth.*

Nitroſulphureous, *Nitre mix'd with Sulphur, or of a nitrous and ſulphureous nature or quality.*

O

Oblique, *Croſs, traverſe, aſlope, not ſtraight or right.*

Oblong, *Longiſh or ſomwhat long.*

Oeconomie, *A certain order of doing any thing, an houſhold rule, regiment or governance.*

Oeſophagus, *The mouth of the ſtomack.*

Olibanum, *An outlandiſh Gum.*

Opiologie, *The doctrine of Opium.*

Opium, *Made up of the juice of wild poppie, uſed to ſtupifie and bring into a ſenſleſs ſleep.*

Opiats, *Medecines made of Opium for ſome part if its ingredients to cauſe ſleep and eaſe for pains.*

Optic, *Belonging to the ſight, as the Nerves that bring the vertue of ſeeing to the eyes.*

Opopanax, *The juice made of a certain herb.*

Ophthalmic, *A medicine to cure the diſeaſes of the eyes.*

Orgaſm, *Rage or fury.*

Orifice, *The hole of a wound, or the mouth of any thing.*

Origine, *Beginning, riſe or birth of a thing.*

Orbicular, *Of a round form or ſhape.*

Orthopnœa. *Is ſuch a ſtraitneſs of breath, that one cannot breath, or fetch breath without ſtretching out of the neck, or holding it upright.*

Os Pubis, *Is the bone at the bottom of the belly, juſt above the privie member.*

Os Sacrum, *Or the ſacred bone, is the great bone upon which the end of the ridge or back-bone reſteth.*

Oviparous, *Egg-bearing Creatures, or that lay Eggs.*

P

Panacea, *All-heal, or a plaiſter or medicine to heal all things.*

Pancreas, *Called in a Hog the Sweet-bread. It is a remarkable kernel placed below the Ventricle, and ſerves for a diviſion of the* Vena porta, *as alſo to defend the Ventricle from touching the back.*

Papillary, *Belonging to the Teats, or like paps or teats of a dug.*

Papillæ, *Little paps, or little pieces of fleſh in the body, ſo called of the ſhape of paps.*

Paracenteſis, *Is an inciſion made to draw forth the water from thoſe ſwelled with the Dropſie, vulgarly called a Tapping.*

Paracelſus, *A famous Dutch Emperick,*

Paradox, *A thing contrary to the common opinion,*

Paralytick, *That is troubled with the Palſie.*

Parallel, *Equal, alike, like a line drawn to write by another.*

Parotida, parotides. } *The two chief Arteries and Veins on the right and left side the throat, going up towards the ears.*

Parotid, *To them belonging.*

Particles, *Little parts or portions of any thing.*

Paroxisms, *Fits, or the returns of fits, as of an Ague or Feaver.*

Pathetic, *To passion belonging, Nerves so called by Dr.* Willis.

Pathologie, *The doctrine of the passions, also as Ætiologie.*

Pathognomic, Pathognotic, } *That moveth the affections, or that properly belongs to the thing.*

Pepasmus, *A kind of a concoction of the humors in the disease.*

Percolation, *A straining thorow.*

Pericardium, *The thin skin or membrane covering the whole heart like a case.*

Peritonæum, *The inner skin or rim of the belly joyned to the Caul, wherewith all the Intrails are covered, called by the Anatomists* Siphach.

Peripneumonia, *An Inflammation or Impostume of the Lungs, with a shortness of breath.*

Peristaltick, *Motion, a certain motion compassing about as in certain convulsions.*

Perspiration, *Breathing thorow, as sweat through the pores of the body.*

Perturbations, *Disturbings, vexing troubles, disturbances.*

Pervious, *That may be passed through, or that has a passage or way through it.*

Peruvian, *Belonging to the Country of* Perue, *as* Peruvian, *Balsom thence brought.*

Pharmacy, *The Medicines of the Apothecaries; or the art of making them up.*

Pharmaceuticks, *The part of Physick that cureth with Medicines.*

Phænomena, *Appearances of things.*

Philonium, *A Confection made of many ingredients compounded together.*

Philtre, *A potion to cause Love; or poysonous Medicines that operate magically, or not naturally.*

Phlebotomie, *Letting blood or opening of a Vein.*

Phlegmon, *An inflammation of the blood, with a red swelling.*

Phlegosis, *The like Inflammation fiery red.*

Phthisis, *The Consumption of the Lungs, with a wasting away.*

Phthisic, *Belonging to that disease, or that has it.*

Physiologie, *The reasoning of the Nature of a thing, or the searching it out.*

Pia Mater, *The thinner inward soft skin that inwrappeth the pith and marrow of the brain, and is every where joyned to it; called the thinner and soft Meninx,*

Pica, *The longing disease of Women with Child.*

Pineal, *Kirnel in the brain, in form of a Pine-apple, called also* Conarium.

Pituitous, *Snotty thick phlegmatick matter.*

Plastic, *Formative or that worketh and formeth.*

Plenitude, *Fulness or store.*

Plethora, *A fulness or plenty of humours in the body, good or bad.*

Pleura, *A skin or membrane which clotheth the ribs on the inside, which being inflamed by the blood, causeth the Disease called the Pluritie.*

Pneumatic, *Windy or belonging to wind or breath.*

Pneumonic, *One sick of the disease of the Lungs.*

Polypus, *A filthy disease in the nose, breeding stinking and ulcerous flesh within the nostrils.*

Pontic, *Belonging to the Sea or to the Country of* Pontus.

Porta Vena, *Is a Vein that hath many small roots fastened to the Liver, from whence arising grow into one trunck or stock, which going forth from between two eminent lobes of the Liver, passes into the Gall, Ventricle, Spleen, Mesentery, and Caul, and other parts of the body.*

Pores, *Are the little small holes or breathing places in the skin of the body, through which heat and moisture insensibly breath continually.*

Porous, *Full of such like holes or pores.*

Praxis, *Practice or action.*

Præcipitation, *A casting down; used by the Chymists for a certain way of distillation, when the matter is thrown back into the receiver.*

Præternatural, *Besides or more than natural; not natural or besides nature.*

Præceding, *Going before.*

Prævious, *That went before.*

Præcordia, *The parts about the heart, as the Diaphraghma, or midriff separating the heart from the other bowels.*

Præmised, *Sent before, or before made known.*

Præpolency, *Of very great force, strength, excellency, or virtue.*

Priapismus, *Is a disease in the Yard, that causeth it alwayes to be stretch'd forth, and extended without any thing provoking it.*

Primigenious, *The first original; not having its beginning or birth of another.*

Procatartic, *Remote, not next cause of a disease.*

Processes, *The parts of a bone (or other parts) that exceed the natural height or posture, and are yet dependances of the bone and parts, and proceed or go out from it; as also some Nerves going forth of other Nerves, being still parts of the main stock.*

Profusions, *A pouring forth, a running or spreading abroad.*

Profluvium, *A flowing of humors, a gushing forth in abundance, a flood.*

Profligated, *Driven away, or overthrown, discomfited.*

Prognosis, *The præscience or fore-knowledge, or Prognostication of the event of the disease.*

Promptuary, *A Store-house, or place where any thing is laid up.*

Prominences, *Bunchings forth, those parts that notably shew themselves above the rest, as a hill in a plain.*

Prophasis, *The appearing or shewing of a thing.*

Prophylactic, *That part of Phyſick that preventeth and preſerveth from diſeaſes.*
Proſtatæ, *Kernels in the Groyn, or about the privie-members.*
Protenſion, *A ſtretching forth at length.*
Protraction, *A drawing forth at length, alſo a prolonging.*
Protuberance, *A bunching forth above the reſt.*
Protruſion, *A thruſting forward.*
Pſoa, *A great muſcle beginning at the* 11th. *rib and going through the bowels to the privie-members.*
Pſora, *The ſcabbado, or ſcabbineſs with puſtles.*
Ptyaliſmus, *Sallivation, or a great flux of ſpitting.*
Ptiſan, *Decocted Barly, with other ingredients.*
Puretology, *The doctrine, or a diſcourſe of Feavers.*
Pungitive, *Pricking like needles.*
Purulent, *Full of matter or filthy corruption; as a Bile or Impeſtume.*
Pubis, *That part of the privie-parts where the hair grows.*
Pulſific, *That ſtrikes as the Pulſe or beating of the Arterie, or that cauſes ſuch ſtriking or pulſe.*
Pylorus, *Is the lower mouth of the ſtomach or ventricle, whereby the meat being digeſted, is tranſmitted into the Stomach-gut or Maw-gut.*
Pyramidical, *Of the ſhape or form of a Pyramide, broad at bottom and ſharp at the top.*
Pyretology, *The doctrine of Feavers, or of fire.*

Q

Quotidian, *Daily or every day: an Ague that comes every day.*
Quartan, *Every fourth day; an Ague that has two days of intermiſſion, and comes on the fourth day again.*

R

Ramifications, *Branchings forth like the Veins, Arteries and Nerves up and down the body, reſembling the ſmall twigs and branchings of Trees.*
Rarefaction, *a making of any thing rare or thin.*
Ratiocination, *Reaſoning, debating, or arguing of any thing, or the facultie of reaſoning.*
Reciprocation, *a returning back, or a mutual partaking of a thing, or depending on another by a mutual conſequence.*
Recrement, *Any ſuperfluous matter, or thing in the blood or body, or any of the parts.*
Redundancy, *Superfluity, overflowing too much of a thing.*
Receſſes, *The private and hidden parts of the body or any hid place.*
Refection, *A repaſt of meat and drink, a refreſhing.*
Refraction, *A breaking off, or rebounding back.*
Reflection, *A bending back or rebounding.*
Refrigerate, *To make cool, or to refreſh with cooling; as fanning one in great heat.*
Regurgitate, *To ſwallow up again; or to ſup up again what it before had parted with.*
Regulus, *The droſs of metals.*
Renal, *Belonging to the Reins.*
Reiterated, *Repeated, or the ſame thing done or performed again.*
Remora, *A ſtop, let, or ſtay to any thing; a figurative ſpeech taken from a little fiſh ſo called, which is ſaid by cleaving to the keel of a ſhip, to ſtay it in its courſe.*
Repletion, *A fulneſs or filling full, or abounding.*
Repullulate, *To bud or ſpring forth again, as trees in the Spring.*
Reſine, *A Chymical extraction of ſeveral druggs ſo called being in ſubſtance like to Roſine or Reſine.*
Reſpiration, *A breathing forth or a venting.*
Reſolution, *A diſſolving or unbinding, a looſning.*
Retort, *A Chymical Veſſel.*
Reverberatory, *A furnace by which matter is calcined or conſumed with the flame.*
Rhomboides, *A Geometrical figure with unequal ſides.*
Rhombus, *A Geometrical figure with equal ſides but not right angl'd, like a quarry of glaſs.*
Rhubarb, *A root brought out of the* East-Indies, *almoſt like a dock root, uſed to purge choler.*
Riſibility, *Laughter, or the faculty of laughing.*
Riverius, *A famous Phyſician.*
Rotation, *A going round like a wheel, a moving round.*
Rudiments, *the firſt beginnings and principles of thing:.*

S.

Saline, *Saltiſh or belonging to Salt.*
Salt-peter, *Or Salt of the Rock: a ſalt got out of the Earth, contracted from ſeveral dungs of Fowls or other Creatures, as Pigeons, Poultry, and Cattle, and from the Urines of Beaſts, and is one of the Ingredients of which they make Gunpowder, much uſed in Chymiſtry.*
Sal-prunella, *A Salt made out of Salt peter.*
Sal-ammoniacus, *A Salt of the Earth, found among the Sands in* Lybia.
Sal alcali, *Salt of aſhes made of the herb* Kali, *but uſed alſo for the ſalt of other herbs burnt to aſhes and ſo extracted.*
Salvatella, *Vein, is a branch, which ſpringing out of a Cephalick Vein, in the outſide of the Cubit, ſtretcheth above the wriſt and extream part of the hand, between the Ring-finger and the liitle finger.*
Salivate, *To ſpit or cauſe one to void much ſpittle.*
Salivation, *A great flux of ſpitting, or avoiding of ſpittle more than ordinary at the mouth.*
Sanguineous, *Bloody or belonging to the blood.*
Sanguification, *The making of blood, or the changing the nouriſhment into blood.*

Sanguiducts,

Sanguiducts, *The Veſſels that carry the blood through the body, as the Veins and Arteries.*
Sarſaparilla, A *drugg brought from the* Weſt-Indies, *uſed in many decoctions.*
Sagapenum, *A kind of Gum or Roſin that runs forth of the Shrub called* Ferula.
Scammony, *The juice of an herb which violently purgeth choler; it is alſo called* Diagridium.
Scapular, *Muſcle; a muſcle belonging to the ſhoulders, and ſerves for the moving of them.*
Scheam, *Is a figure or draught of a thing; alſo taken for an Aſtrological Table of the* 12. *Houſes.*
Schirri & Scirri, *Are hard ſwellings in the fleſh, without pain but hardly curable.*
Schirrous, *Full of ſuch hard ſwellings.*
Sclerotic, *That is troubled with ſome tumour in the third panicle of the eye, called the* Cornea membrana, *or ſomewhere thereabouts.*
Scorbutick, *That is troubled with the diſeaſe called the* Scorbute *or Scurvey.*
Scordium, *A uſeful herb in Phyſick, having leaves almoſt like Germander.*
Scotomies, Scotomie, *Turnings round; a diſeaſe in the head, when all things ſeem to turn round.*
Scrotum, *The outward skin of the Cods, where the hair grows.*
Scutiform, *In the form of a Shield or Buckler.*
Sedal, *Veins in the Fundament.*
Secluſion, *A thruſting forth or out.*
Secundine, *The After-birth, or that which inwraps the Child, which follows after the Birth of the Child; vulgarly called the After burthen; of Anatomiſts the* 4th. *membrane of the eye, called* Chorion; *and that firſt clotheth the optic ſinew is called the* Secundine.
Secretion, *A ſeparating or putting apart.*
Secreted, *Separated apart.*
Senna, *Or Sena, the leaves of a Plant, that Purgeth Phlegm, Choler and Melancholy.*
Senſory, *The organ of feeling, or diſcriminating by the ſences; the common ſenſory or ſeat of ſuch organ, placed in the brain.*
Septic, *That hath the force of corrupting or putrifying, or that maketh rotten or ripe the matter in a ſore.*
Series, *An order, courſe, or ſucceſſion of things, a row or courſe of things orderly one after another.*
Serous, *Humour, the whey or watery humour that accompanieth the blood, and which makes it fluid, and is ſeparated and put off from the blood into the parts of the body.*
Seroſities, *Such ſerous humours abounding.*
Serum, *The whey or watery humour of the blood, the ſubſtance of the ſerous humour.*
Sinus, *A boſom or hollow turning, or outlet of waters or an inlet or arm of the Sea.*
Soldanella, *Is the Sea-colewort or Folefoot.*
Solitive, *Looſening, or that maketh the body looſe.*
Solſtices, *Are two, the Summer and the Winter ſolſtice; the firſt is about the twelfth of* June, *when the Sun is neareſt to us and makes with us the longeſt day; the laſt is about the* 12 *of* December, *when the Sun is at its greateſt diſtance from us, and makes with us the ſhorteſt day.*
Solving, *Looſening or unbinding.*
Solution, *A looſening or weakning, as of the Nerves or joynts.*
Solvent, *That which diſſolveth or openeth the parts of the matter to be wrought upon.*
Spagiric, *Belonging to Alchymie, or to the Chymical art.*
Spaſms, *Cramps or Convulſions of the Nerves.*
Spaſmodic, *Belonging to the Cramp or Convulſion, or hauling of the ſinews.*
Spaſmology, *The doctrine of the Convulſion or Cramp of the ſinews.*
Speculative, *Contemplative or notional.*
Speculation, *A ſeeing or diſcovering a thing by contemplation.*
Species, *A kind more particular than Genus, and may be communicated to more generals; as a Cow and an Horſe are of a different ſpecies, but both Animals or Beaſts.*
Spermatic, *Belonging to the ſperm or ſeed,*
Sphaceliſmus, *A blaſting or a mortification of a part.*
Sphincter, *Is the round muſcle that encompaſſes the mouth of the Arſe gut, which keeps the excrements from an involuntary coming forth.*
Spine, *The back-bone, or long-joynted bone that goes down the back.*
Spina dorſi, *The ſame; the bone of the back, the Chine.*
Spinal, *Belonging to that bone.*
Spiral, *A turning about, and as it were aſcending.*
Splanchnic, Splanchnical, *Belonging to the Spleen.*
Splenitic, *Troubled with the diſeaſe of the Spleen.*
Spodium, *A ſort of ſoot made out of the making and trying of braſs.*
Spontaneous, *Willingly or of one accord, or by the command of the will.*
Sporadical, *That ſeiſeth not after an uſual manner, diſeaſes that ſeize privately here and there on People diſperſedly, not generally or epidemically.*
Squinancy, *Or Squincy, is a ſwelling in the throat, with an inflammation.*
Stagmas, *The mixtures of mettals, or other Chymical things ſet together to ferment and operate one upon the other.*
Stagnation, *A ſtanding ſtill without motion, as a pool.*
Sternothyroeidal, *Muſcle, A Muſcle which reaches from the* Sternon *to the* Os Pubis.
Sternon, *That part of the breaſt where the rib meet.*
Stibium, *Antimony.*
Stiptic, *Or* Styptic, *that ſtraineth, bindeth, or is reſtrictive.*

Strumous, *That belongeth to the Kings evil, or he that hath that disease.*
Subclavian, *Vessels: the vessels that belong to the little ribs of the breast.*
Sublimate, *White Mercury, or Quick-silver Chymically sublimed; Mercury sublimate: of a poysonous nature.*
Subside, *To sink down or fall to the bottom.*
Subsidiare, *That cometh for aid, or to help, or bringing aid or help.*
Subaction, *A kneading, working, exercising. or bringing under.*
Suffusion, *A spreading abroad, or pouring forth.*
Sudation, *A sweating.*
Sudorifick, *That causeth sweating.*
Sulphur, *Brimstone which is found in Mines in the Earth, taken also for one of the Chymists principles.*
Sulphureous, *Brimstony, or belonging to Brimstone.*
Superficies, *The outside or overmost part of any thing.*
Suppuration, *A ripening or gathering together of the matter of a sore.*
Surculs, *Little or small shoots or spriggs.*
Sutures, *The joynings together of the bones of the head, which appear as if sowed together with long stitches.*
Symptom, *Is an effect, accident or passion following any sickness, or any sensible grief joyned with a disease, besides the disease it self, as Head-ach with a Feaver.*
Sympathy, *Is a natural passion of one thing to another, or an agreement in qualities.*
Sympathic, *Agreeing in affections or passions.*
Symphony, *A consent or agreement in harmony.*
Sympraxis, *A joynt exercising or agreement in practice or action, a consent in operation,*
Syncope, *A swooning, or a loss of all sense.*
Synochus, *Is a Feaver without changes or intermissions, a continual Feaver.*
Synthesis, *A figure contrary to Analysis; a concession of some things arising from the matter.*
Systasis, *Constitution.*
System, *The work or part of something that is constituted or a theam or work compacted of several parts, a part of which is a System.*
Systole, *Is the motion of the heart and arteries, contrary to Diastole, by which they are contracted, but by this they are dilated.*
Syzygies, *Are the Nerves that carry the sense from the brain to the whole body; also the conjunctions of the Sun, Moon and Stars.*

T.

Tabes dorsalis, *The mourning of the Chine; a wasting or consumption of the back.*
Tabid, *Consumptive, pining, or wasting.*
Tamarinds, *An outlandish fruit, good to quench thirst and to allay the heat of choler, used in Medicines.*
Tarantula, *A little venomous creature found in* Apulia, *a part of* Italy, *whose poyson being by biting diffused through the body, strikes the Nerves with strange tumors and Convulsions, which is only curable by the party so bitten, being provoked to continual dancing, by which means the poyson is evacuated through the pores from the Nerves.*
Tartar, *Is a concreted matter taken from the Lees of Wine, very medicinable.*
Tenacious, *Holding or cleaving fast.*
Tenasm, *A great desire of going to stool, and yet can do nothing.*
Tenous, *Thin, slender, or small.*
Tendons, *Certain parts in the top of the Muscles, which serve aptly for the moving the muscle, being the lodging place of the animal spirits, belonging to the Muscle, and out of which they issue into the muscle; they are harder than the muscles, yet softer than a gristle or ligature.*
Terrestial, *Earthly, or belonging to the Earth.*
Testes, *certain tubercles in the brain of a man and beasts, so called because like to the stones of a man.*
Tetanism, *A kind of Cramp that so stretcheth forth the member that it cannot bow nor bend any way.*
Texture, *Frame or make of a thing.*
Theorie, *Contemplation, or speculative knowledge of a thing.*
Theriacal, *Or Treacle, a Medicine of a diverse composition invented against poysons.*
Therapeutick, *The curatory art of medicine, or that which belongs to the curing part.*
Theorem, *An Axiom respecting contemplation.*
Thesis, *A position or a general question or argument to be discussed.*
Thorax, *The breast or the middle part of the body, reaching from the throat or neck to the lower ribs.*
Thoracious, *Belonging to the Breast or Thorax, or medicines good to help the disease of the Thorax.*
Tinged, *Dyed or dipped, or that has received a colour.*
Tincture, *A dying or colouring, or the dye or colour of any thing. It is used also for high Cordials and Chymical medicines, of a liquid substance, and stained with some tincture or colour.*
Tolutan, *Balsom: A Balsom brought from the* Indies, *so called.*
Topics, *General places or heads for invention; a part of Logick, noting the places of Invention.*
Torpedo, *The Cramp-fish that benummeth the hands of the Fishers, holding the Net or Angle with a subtil poyson.*
Torpor, *A numness, heaviness or stiffness and unaptness for any motion.*
Torrid. *Dry, burned, or parched.*
Torrified, *Made dry or parched, or burnt or scorched.*
Trachea, *The Weasand or Wind-pipe; the sharp arterie.*

Tragacanth,

Tragacanth, *An outlandish Gum, commonly called Gum-dragganth.*

Transpiration, *A breathing through as a vapour through the pores.*

Transpire, *To breath through, as the humors insensibly through the pores of the skin.*

Trapezial, *Belonging to a Geometrical figure, so called of four sides.*

Troches, *Are little round Cakes made up of powders, and used in medicines.*

Trochlear, *Muscle: A muscle made almost like a windlas or pulley, whereby things may be strongly hauled or pulled.*

Tropicks, *Two great imaginary Circles in the Heavens, being of equal distance from the Æquator, the one called the Tropic of* Cancer, *to which the Sun being come, he returns back towards the Tropick of* Capricorn; *to which being come here again, returns towards the Tropic of* Cancer; *being the limits of the Suns progress.*

Tubes, *A Mathematical Instrument, hollow like a pipe.*

Tubercles, *Little swellings or pushes, wealks or weales in the skin or flesh.*

Tubuli, *Small little pipes, the Veins and very small Arteries, or little hollow parts of the bowels so called.*

Tumified, *Swelled or puffed up.*

Tumor, *An hard rising or swelling in any part of the body, with or without inflammation.*

Turbith, *A root much used in Physick to purge phlegm.*

Turgency, Turgescency, *A swelling or rising up.*

Turgid, *Swelled or risen up, puffed up, moved very much.*

Tympany, *A kind of dry Dropsie, or windy swelling of the belly, gathered between the* peritoneum *and the bowels, which if it be smitten upon, soundeth almost like a Drum.*

V.

Valves, *A part of the brain, made like folding doors so called.*

Van Helmont, *A Famous Dutch Doctor.*

Vapid, *Dead, decay'd, without tast or smack.*

Vegetation, *A growing or putting forth, or flourishing as a Plant.*

Vegetal, *Belonging to such a growing or flourishing.*

Vegetable, *That which hath life, and growth, but not sense, as herbs and trees.*

Vehicle, *That which carrieth or beareth another thing as the blood is of the animal spirits.*

Vena Porta, *See* Porta Vena.

Vena Cava, *See* Cava Vena.

Venous. *Belonging or appertaining to a Vein.*

Ventricle, *Is the stomach, or that part which receives the meat and drink, being swallowed down, and which hath in it self the virtue of digestion.*

Ventricles, *Of the heart, two notable little hollow caverns on each side of the heart.*

Ventricles, *Of the Brain, several notable caverns therein.*

Vermiculations, *Creeping like a Worm, or motions like the creeping of a Worm.*

Vernal, *Belonging to the Spring, or in the time of the Spring.*

Verberation, *A beating or striking.*

Vertigo, *A dizinesse, giddinesse and turning round within the head. A certain disease, which causeth a turning within the head.*

Vertebral, *Belonging to the joynts of the back-bone.*

Vertebræ, *Those several joyntings and knittings of the back-bone or chine, so called of Anatomists.*

Vesicatories, *Medicines that raise or cause Blisters where applied.*

Veterans, *Old Soldiers, or any thing that hath served long in a place.*

Viaticum, *Voyage provisions, as meat and drink upon a journey.*

Vibration, *A shaking, striking or quavering.*

Vicinity, *Neighbourhoood, or nearness of dwelling or being.*

Viscid, *Clammy, or sticking like Bird-lime.*

Viscosity, *A Clammines or glewines.*

Viscera, *Are the chief Entrals or Inwards, as Heart, Liver, Lungs, Spleen, the Bowels,* &c.

Vitriol, *Copperas, a certain Mineral found in several Countreys used in Medicines.*

Vitrolic, *Belonging or appertaining to Vitriol.*

Umbilic, *Belonging to the Navel, or of the likenes or shape of the Navel*

Undulation, *A wavering like the waters, where one follows upon the heels of the others.*

Unctuosity, *An oylines or juicines.*

Uuctuous, *Oylie or juicy.*

Volatile, *That easily flies away, or that is apt to flie or vanish.*

Ureters, *The pipes or passages; by which the Urine passes from the Reins to the Bladder.*

Urinary, *Belonging to the Urine, or the passages of the Urine.*

Uterine, *Belonging or appertaining to the Womb.*

Uvea, *The fourth thin membrane of the eye, called also* Corion.

W.

Wezand, *The Windpipe or Throat.*

X.

Xeroeus, *Wine: A Spanish Wine so called, I suppose they mean Tent.*

Here ends the Table of hard names.

ON THE

AUTHORS

Medical-Philoſophical Diſcourſes.

THE intricate and hidden Cauſe of things,
Both Peace and Strife by what means Nature brings,
What various motions Bodies do inſpire;
What mixes with the Waters quenchleſs Fire,
What Bonds the Elements together tie,
Before this happier Age unfolded lie:
Things hid to former Ages, and unknown,
The Secrets of the World to all are ſhewn.
Metals dug from the Bowels of the Earth,
Tho they from Phœbus *boaſt their heavenly birth,*
We without light dark and obſcure behold,
And Splendor's found only in burniſht Gold.
Iron unknown lay hidden without light,
By Slaves wrought from the Mine grows dazeling bright.
This to whole Troops confuſion doth afford,
Wit, which firſt fram'd, ſtoops to the Victors Sword.
We thus of old did Nature ſearch in vain,
Our Arts did only ith' outward Bark remain,
But now we her hid Myſteries unfold,
And the great Secrets of the World behold.
Better than us, her ſelf can hardly tell,
What Love doth far within high Mountains dwell.
What flame firſt gives the Marble Quarry birth;
To Metals forms blind Rudiments of Earth,
And the hard child doth to perfection bring:
Why Earth ſhews her rich Treaſures in the Spring;
And ſhines, made brave with her own Native Flowers:
What gentle Gales, and what ſweet moiſtning Showers,
Do on the pregnant Goddeſs Seed beſtow;
Whilſt Heavenly Iris *mounts the cloudy Bow.*
Why Ceres *ſwells with watery Nymphs embrace,*
What Strife, what Wars ſpring from hot Bacchus *Race:*

What

What Vulcan *doth th'* Ætnean *Fornace blow;*
What doth ſoft fires through all Bodies throw;
What Spirit nimbly moves the human frame:
Whence Milky Juice here, there a Purple Stream,
Watering the Body: whence the crimſon Flood;
And the quick Circulation of the Blood.
What hidden fires in Veins and Intrals burn,
Which do the boiling Blood to Feavers turn.
What mixes freezing cold with parching heat,
And makes the different Zones together meet.
Whence comes the Peſtilence with Stygian breath,
Riding on blaſting Winds, and arm'd with death.
What propheſying Humor through the Reins doth paſs,
What colour, and what odour in the Glaſs?
All things lie open now; He did not know
So much to whom Prometheus *did beſtow*
His ſtollen Fires: We now every part
Of the whole Earth compaſs about with Art.
He's happy who cauſes of things can ſhew;
Sacred to Nature, and to Phœbus *too;*
About his Temples Delphic *Laurels ſpread,*
And Flames of Lightning ne'r ſhall blaſt his Head.
Whom Hermes *doth with Sacred Arts imbue,*
VVhoſe Labours, Learning out of Darkneſs drew,
May all's days happy be, may he ſhine bright,
And may he ſtill enjoy Celeſtial Light:
May no Diſeaſe infect with poyſonous breath,
Him, who gains Health from Sickneſs, Life from Death.

OF

OF FERMENTATION, OR THE Inorganical Motion OF NATURAL BODIES.

CHAP. I.

Of the Principles of Natural things.

THere is nothing more rarely to be met with in the Vulgar Philosophy, where Natural things are unfolded, with the vain figments of Forms and Qualities, than the word *Fermentation:* but among the more ſound (eſpecially of later years) who reſpect the Matter and Motion chiefly in Bodies, nothing is almoſt more uſual. But Fermentation hath its name from Ferveſcency, as Ferment from Ferviment or growing hot. The word is well known in making of Bread, and in the purging of new Wine, Beer, and other potable Liquors: thence it is alſo applyed to other things, which are wont to ſwell or grow turgid, after the ſame manner: that at length it ſignifies, whatſoever Effervency or Turgency, that is raiſed up in a Natural Body, by particles of that Body variouſly agitated.

Bodies of a diverſe Conſiſtency and Habitude, are apt to a Fermenting, *viz.* either Thin or Thick, Liquid or Solid, Animate or Inanimate, Natural or Artificial; in all which is found an Heterogeneity of parts or particles, to wit, there are in them ſome ſubſtances light, and alwaies endeavouring to fly away: and alſo there are others thick, earthy, and more fix'd, which intangle the ſubtil Particles, and detain them in their Embraces, whilſt they endeavour to fly away; from the ſtrivings, and wreſtlings of theſe two twins, in one Womb, the motion of Fermentation chiefly proceeds; but on the contrary, what things do not Ferment, for the moſt part conſiſt of like Particles, and are of the ſame Figure and Conformation, which indeed conſociate among themſelves, without any Tumult or Turgeſcency, lye quiet, and enjoy a deep peace. If Muſt, or new Wine, or new Ale or Beer, be cloſely Bottl'd up, or put into Veſſels of ſmal vent, they will grow ſo very hot, that often the Veſſels are in danger of breaking. But if the ſame Liquors, being Diſtilled by themſelves, and then what is ſeperated, ſhut up, from thence no motion or heat will follow. Wherefore, Diſtilled Waters, hot Spirits, Oyls, fixed Salts of Herbs, and very many other more ſimple preparations of Chymiſts, remain a long while without any Alteration or Fermentation, perhaps ſome of the Particles do evaporate, but the reſt do not tumultuate. In the mean time the juice and blood of Vegetables or Animals, as alſo all Liquors Concreted, and compounded of many things, quickly Ferment, and from thence enter into divers turns of changes. The Spirit of Wine being cloſely ſhut up in a Phial ſhews no ſign of growing hot, but if but a little Oyl of Turpentine be added to this Spirit, the Particles of the Liquors will ſo leap forth, that I have ſeen it break a Glaſs Hermetically

Sealed. All Diſtilled Waters of Herbs, ſo they be kept ſimply in a Glaſs, will remain incorrupt a long time, but if you add to the ſame Sugar or Syrup, it preſently grows ſoure, and is corrupted: Wherefore, that the Fermentation of Bodies may be rightly unfolded, we muſt inquire what thoſe Particles or Subſtances are, and of what Nature, o which mixt things are Compounded, and from whoſe being put together, and mutual ſtrivings, motions for the moſt part naturally proceed.

Altho' there be many and divers Opinions of Philoſophers concerning the beginning of Natural things, yet there are three chiefly deſerve our Aſſent, and Faith, before the reſt. That famous fourfold Chariot of the Peripateticks obtains the chief place, which emulous of the four wheel'd Coach of the Sun, is hurried by a quick paſſage, through the fictitious Heaven of the firſt Matter, and meaſures that vaſt and empty thing, with a perpetual reciprocation: For they ſay, all things are Conſtituted out of Water, Air, Fire, and Earth; and that out of the diverſe tranſpoſition of theſe, Generation and Corruption, as alſo the changes of all alterations whatſoever, do ariſe. In the ſecond place, and next, ſtands the Opinion of *Democritus* and *Epicurus*, which lately alſo hath been revived in our Age, this affirms all Natural effects to depend upon the Conflux of Atoms diverſly figured, ſo that in all Bodies, there be Particles Round, Sharp, Fourſquare, Cylindrical, Chequer'd or Streaked, or of ſome other Figure; and from the divers changes of theſe, the Subject is of this or that Figure, Work, or Efficacy. The third Opinion of the Origination of Natural Things, is introduced by Chymiſtry, which, when by an Analyſis made by Fire, it reſolves all Bodies into Particles of Spirit, Sulphur, Salt, Water, and Earth, affirms by the beſt right, that the ſame do conſiſt of theſe. Becauſe this Hypotheſis determinates Bodies into ſenſible parts, and cuts open things as it were to the life, it pleaſes us before the reſt.

As to the four Elements, and firſt Qualities from thence deduced, I muſt confeſs that this Opinion doth ſomething help for the unfolding the Phænomena of Nature, but after ſo dark a manner, and without any peculiar reſpect to the more ſecret receſſes of Nature, it ſalves the appearances of things, that 'tis almoſt the ſame thing, to ſay an houſe conſiſts of Wood and Stone, as a Body of Four Elements. The other Opinion, which is only a peice of the *Epicurean* Philoſophy, foraſmuch as it undertakes Mechanically the unfolding of things, and accommodates Nature with Working Tools, as it were in the hand of an Artificer, and without running to Occult Qualities, Sympathy, and other refuges of ignorance, doth happily and very ingeniouſly diſintangle ſome difficult Knots of the Sciences, and dark Riddles, certainly it deſerves no light praiſe: but becauſe it rather ſuppoſes, then demonſtrates its Principles, and teaches of what Figure thoſe Elements of Bodies may be, not what they have been, and alſo induces Notions extremely ſubtil, and remote from the ſenſe, and which do not ſufficiently Quadrate with the Phænomena of Nature, when we deſcend to particulars, it pleaſes me to give my ſentence for the third Opinion beforementioned, which is of the Chymiſts, and chiefly to inſiſt upon this in the following Tract, to wit, affirming all Bodies to conſiſt of Spirit, Sulphur, Salt, Water, and Earth, and from the diverſe motion, and proportion of theſe, in mixt things, the beginnings and endings of things, and chiefly the reaſons, and varieties of Fermentation, are to be ſought. If any one ſhall object, That the Atomical, and our Spagyric Principles are altogether ſubordinate, to wit, that theſe, tho at the laſt ſenſible, are reſolved into thoſe, only to be ſignified by Conception; I ſhall not much gainſay him, ſo it ſhews that thoſe Conceptions are real. I being dull and purblind, leave the more accurate to quick ſights, being content to be ſo wiſe as to perform the buſineſs of the outward Senſe with Reaſon: for I profeſs, it pleaſes not me, to deviſe or dream Philoſophy. But that our Work may more rightly proceed, it will be neceſſary, to ſpeak firſt a few things of theſe kind of Principles in general, and of their Affections.

I mean by the name of Principles, not ſimple and wholly uncompounded Entities, but ſuch kind of Subſtances only, into which Phyſical things are reſolved, as it were into parts, laſtly ſenſible. By the inteſtine motion, and combination of theſe, Bodies are begot, and increaſe: by the mutual departure and diſſolution of theſe one from another, they are altered, and periſh. In the mean time, what Particles are gathered together in the Subjects, or depart away from them, will appear under the form of Spirit, Sulphur, Salt, or one of the reſt.

CHAP.

Chap. II.

A Deſcription of the Principles of Chymiſts, and the Properties and Affections of them.

1. Spirits are Subſtances highly ſubtil, and Ætherial Particles of a more Divine Breathing, which our Parent Nature hath hid in this Sublunary World, as it were the Inſtruments of Life and Soul, of Motion and Senſe, of every thing; whilſt they of their own Nature are alwayes enlarged, and endeavouring to fly away, leſt they ſhould too ſoon leave their ſubjects, they are bound ſometimes with more thick Particles, that by entring into them, and by ſubtilizing them, and variouſly unfolding them, they diſpoſe the ſubſtance to maturity, as is to be obſerved in the Vegetation, and Fermentation of Bodies; ſometimes being reſtrained within ſome ſpaces, to wit, the Veſſels or Bowels of living Creatures, they are compelled more often to repeat the ſame meaſures of their motions for the performing the works of Life, Senſe and Motion. From the motion of theſe proceed the animation of Bodies, the growth of Plants, and the ripening of Fruits, Liquors, and other Preparations; they determinate the Form and Figure of every thing, prefixed as it were by Divine deſignation: they conſerve the bonds of the mixture by their preſence; and open them by their departure, at their pleaſure: they bridle the irregularities of Sulphur and Salt. The perfection and ſtate of every thing conſiſts in the plenty and exaltation of Spirits, and the fall and declination, in their want and defect.

As to the Subjects in which the Spirits are, Minerals becauſe they are of a more fixed nature, wanting Motion and Vegetation, are almoſt without Spirits, or at leaſt are contented with a few. For the birth and growth of Vegetables they are required in a more moderate quantity. In the Conſtitution of a living Creature, where there is greater Uſe of Spirits, for Senſe and Motion, a far more plentiful quantity is found. In the works of Art, and chiefly in thoſe which aſcend to perfection, by Digeſtion and Fermentation, there are found to be a ſufficiently great proportion of Spirits: but in all ſubjects whatſoever, whilſt the immerſed Spirits are mingled with the other Principles, their condition or ſtate comes under a threefold conſideration: for they are either depreſſed and ſcattered, and ſo involved with more thick Particles, that they are very little ſeen, or ſhew forth their powers, as in things undigeſted, crude and unripe, may be perceived, in which the Spirits can hardly extricate themſelves into motion, and from which they can hardly be drawn by diſtillation. Or ſecondly, the Spirits flying forth from the thick ſubſtance of the reſt, are full of vigor, ſhake and rightly diſpoſe the more groſs Particles, ſubtilize the thick, digeſt the crude, & bring things to the ſteme or height of maturitity & perfection: or laſtly, Spirits having obtained the height of things, do luxuriate and make excurſions out of the Body: hence thoſe that remain, are by degrees leſſened of their plenty and ſtrength, until being leſs in power than the Particles of the Salts and Sulphur, they are put under their yoak, and by little and little are deſtroyed and driven away out of the Subject; on this threefold ſtate depends the beginnings or rudiments, the maturity and exaltation, and the defect and end of things.

It is obſerved, when the Spirituous Latex is drawn forth of any Liquor by Diſtillation, that the vapor or ſteam is not elevated into dew, that is, comes together in little drops or dew, every where poured forth, as it is wont to do in watery things; but it is divided into ſtreaks, and many little rivulets, and renders the Alembic mark'd in every part with ſtraight lines, only not meridional, leading from the Centre of the top, to the brim of the Circumference. The cauſe of which ſeems to be this, to wit, ſince that the ſpirituous ſubſtance is very ſubtil, it is not eaſily Collected into Liquor, neither is it fixed every where about the ſides of the Veſſel, in its aſcent, as watery Liquors, but alwayes ſtretches further, and unleſs when it comes to the top it ſelf of the little head, doth in no wiſe ſtay; but there the ſpirituous breath, being reſtrained as it were in a punct, and being brought backward, it begins to gather into dew: wherefore, from that top, as it were the Fountain, the Spirits flowing forth on every ſide by ſtreams, deſcend into ſtreaks towards the mouth or brim of the Alembic. And when thoſe lines wholly diſappear, it is a ſign that the ſpirituous ſubſtance is quite ſtill'd forth, and that the watery breath only aſcends.

2. Sulphur is a Principle of a little thicker conſiſtence than Spirit, after that, the moſt active: for when the Spirits firſt break forth from the looſned ſubſtance of the mixture, preſently the Sulphureous Particles endeavour to follow. The Temperament of every thing, as to Heat, Conſiſtency, and amiable frame or contexture, depends chiefly on Sulphur; from hence alſo for the moſt part ariſe variety of Colours and Odors, the fairneſs and deformity of the Body, alſo the diverſity of taſtes. In the Boſom of this, the Spirits immediately, in which as in a Copula, they

are united, by the more hard embraces of the reſt. The ſubſtance of Sulphur, tho leſs ſubtil, is yet of more fierceneſs and unrulineſs than the Spirits are, for this unleſs it be reſtrained, by the embraces of the others, as it were in bonds, and its Particles be detained one from another by the interjection or coming between of the reſt, not only leaves the ſubject, but deſtroys its ſelf, with too impetuous an eruption. Indeed the little bodies of this being gently moved, do cauſe digeſtion, and maturation, ſweetneſs, and many perfective qualities in things: being a little more ſtrongly moved, they induce heat, and exceſs of qualities, inordinations, and chiefly a ſtinking ſavour: but being more impetuouſly moved or ſtirred up, they bring in the diſſolution of Bodies, yea a flame and Burning.

The ſubſtance of Sulphur is never ſeen fincere, yea it conſiſts not of it ſelf from others, but vaniſhes away into Air: its Particle being concreted and chained together with Salt and Earth, are fixed as it were immoveable, as is ſeen in Metals and ſome Stones: or being Diluted with Spirit and Water, and temper'd together with the reſt, exiſt in motion, by which means (as was before ſaid of Spirit) they are in a threefold ſtate, within the ſubſtance of the mixture: for either firſt of all its little bodies being involved with Salt and Earth, or too much drenched with a watery humidity, are obſcured, ſo that they excerciſe but little of virtue, from whence the humid and cold temper of things exiſts, their qualities are Obtuſe, Dull, and of ſmall virtue or force, and the Bodies leſs apt to be inflamed, as is diſcerned in unripe Fruit, raw juices and green Wood. Or ſecondly, The Particles of Sulphur begin to ſhine forth with Spirit, to be more thickly heaped or rolled together, and to appear eminent above the reſt of the Principles. And ſo by its motion, they evaporate the ſuperfluous moiſture, digeſt Crudities, and induce a warm temper in things, active qualities, a lively force and maturation, or ripeneſs: which kind of exaltation of Sulphur may be obſerved in Wine and Liquors long Fermented, in ripe Fruits, in the Youth and florid Conſtitution of living Creatures. Or thirdly, The Sulphureous Particles being gathered into vigor, grow too hot, looſe the bonds of mixture, and deſire to fly away; and from their diverſe manner of departure and ſeparation, the diſſolution of Bodies variouſly happens: For either they evaporate with Water and Spirit, by degrees, and without tumult, and leave their ſubjects lean and dry, which, when the Sulphur is wholly gone, fall into aſhes: Or ſecondly, in Bodies which abound with Sulphur, when the mixture is looſned, and the Spirits begin to fly away, the remaining Particles of Sulphur are wont to be very much moved, and to grow exceeding hot; and being ſhut up in a thick ſubſtance, are gathered together more nearly, (as in Dung and Hay growing hot) and conceive heat, and ſometimes Burning: breaking forth after this manner, by heaps, and impetuouſly, they breath out a ſtinking ſmell, and bring on a rottenneſs to the ſubject. There is a third manner of eruption, whereby the Sulpureous Particles go forth of Bodies, when they withdraw themſelves, as it were with violence, and being gathered together, break forth into fire and flame: whereby indeed becoming unbridled and untamed, they break all bars or lets, and wholly deſtroy the ſubſtance or frame of the Subject: by this means, by their own and proper efferveſcency they procure a Burning, as when they being layed up wet, or the wheels of Carts or Axletree, made hot by motion, do fire, or becauſe Sulphur is inkindled by Sulphur: for its Particles being impetuouſly moved, ſhake or move all that's near them, and carry them into the like motion of Conflagration, as ſhall be more fully ſhewn hereafter, when we ſhall diſcourſe concerning the nature of fire.

3. Salt is of a little more fixed nature than either Spirit or Sulphur, nor ſo apt to fly away; but beſtows a Compaction and Solidity on things, and alſo weight and duration; It retards the diſſolution of Bodies, and promotes Congelations and Coagulations, and very much reſiſts Putrefaction, Corruption, and Inflammation; to wit, foraſmuch as it fixes the too volatile Sulphur and Spirit, and detains them in a Body: wherefore ponderous Woods, Stones, Metals, and what abound in Salt, are hardly enkindled, and remain a long while free from Corruption. Not only the duration of the individual, but alſo the propagation of the Species, depends very much upon the Principle of Salt, becauſe the fertility of the Earth, the growth of Plants, and eſpecially the frequent fœtation, and bringing forth of young, in living Creatures, takes their Original from the Saltiſh Seed: hence it is, that *Venus* is ſaid to ariſe from the Sea, and luſt is called Salacity. For Salt having obtained a flux, gathers together, and ſtirs up into motion, the idle, or too much disjoyned little Bodies of Spirit or Sulphur, and excellently keeps them together with it ſelf, for the producing the firſt ground-work of things.

Salt within the frame of the mixture, is either altogether fixed, when its Particles being almoſt deſtitute of Spirit and Water, but bound together with Earth, or Sulphur, or both of them, grow into Stones, Metals, or Minerals of another kind; which fixity in Nature is imitated in making Glaſs, and Earthen Ware: or Salt is looſned from its fixedneſs, to wit, when its Particles being mixed with the other Principles, and chiefly with Spirit and Sulphur, and Diluted with Water, do unfold themſelves, and being diffuſed through the mixture, do Ferment with the reſt: whilſt the little Bodies of the Salt are after this manner put into motion, there is obſerved of them a threefold State or Condition, to wit, of Fuſion, Volatiliſation and Fluxation.

I call

I call the State of Fusion, when the little Bodies of the Salt being Commixed with the rest, begin as to their smallest parts to be dissolved, and diffused, and explicated here and there, through the whole substance of the mixture, as may be observed in the Germination of Plants, in the first Conception of living Creatures, and in the beginnings of Fermentations; hence spring only a rude and indigested formation of things, an ingrateful savour, and for the most part bitter or biting.

From these first Rudiments of Motions, the Saline Particles ascend by little and little, to Vigor and Volatilisation, together with Spirit and Sulphur: to wit, whereby they run through the whole substance of the Body, and variously move its matter, and dispose it towards maturity. Some little Bodies sharpen, and stir up into motion, others Fix, Establish, and Congeal into a stony hardness. If there be plenty of Spirits and Sulphur, the Particles of Salt, as their handmaids, go about to unite, and associate themselves intimately with them, that they are not only snatched together with them, through all the recesses of the mixture, but (the subject being exposed to Distillation) Salt also ascends in the Alembic, even as the Spirit. From the Volatilisation of Salt, Beauty, and Fairness, and Savour chiefly sweet, happen in things, as in the florid blood of living Creatures, in ripe Fruits, as also in Sugar, Milk, and Hony, we know by experience.

I mean the Fluxation of Salt, when the saline Particles, which being first gathered together, with Earth, or Sulphur, or associated with Spirit, and so remain separated one from another, afterwards the bond of the mixtion being loosened, they become wholly free, and unloosened from the yoak of the rest: for so they flow together, explicate themselves through the whole frame of the subject, and whilst Spirit and Sulphur for the most part fly away, these exercise a dominion over the remainder, and induce a soureness into the whole mixture: by reason of this Fluxation of Salt, Wine, Milk, Blood, and Eatable Things, at first grateful and sweet, grow ingratefully soure when they begin to Corrupt; and for this Reason, all Salts whatsoever, having gotten a Flux, by a violent Distillation by Fire (that is, being driven from the Combination of Earth) grow soure, than if the same scure Liquor, be put upon the insipid dead Head, the Whole lastly becomes salted.

Salt being deprived of the Company of the rest, (except the Earth) becomes at last fixed, as is observed in Sea-Salt, or the incineration made of Herbs, whose Particles so cleave together, that they cannot be pulled asunder by the strongest Fire. when Vegetables are Distilled, some Saline Particles, though but few, made fit for Fusion, ascend with the rest; and from thence some Distilled Waters retain a genuine savour of the mixture: The parts of living Creatures being exposed to Distillation, yeild a Volatile Salt: when Minerals, or ponderous Woods full of Salt, are brought under by Chymistry, the Distilled Liquor is like to Salt that hath gotten a Flux, and is very soure.

Spirit and Sulphur easily unlock the substance of the mixture, and make way for themselves; but Salt cannot, unless it be snatched forth of doors together with the Spirit it self. As Spirit and Sulphur being outwardly applyed, in dissolving or burning a Body, open as it were the doors for their Companions shut within, so also, Salt Liquors Distilled, do the same thing: For Stygian Waters strongly Corrode Metals, and are seen like a flame put to them, to burn and consume the same.

Salt resists Inflammation, for that it detains the Sulphureous Particles in its Bosom, and hinders them from breaking forth. But excepting that Sal Nitre encreases the burning of Sulphur, which indeed happens by accident, because that Salt, as it were an Hermaphrodite, grows very turgid with Sulphureous Particles also, combined in the mixture; wherefore, when the Salt is melted by other fired Sulphur, the shut up Sulphur, breaks forth with violence, and (like a blast from a Bellows) shakes the inkindled fire round about, and drives more impetuously the subject into a Body: In the mean time, if you put the flame to Nitre, it will not be inkindled at all; but being put to a Sulphureous Body, it promotes its enkindling; but the other Salts, less turgid with Sulphureous Particles, or rather destitute of them, being mixt with Sulphur, hinder its inkindling, and sometimes put it out.

So much for the active Principles, which effect, as it were, the first ground-work of Bodies: those which follow, chiefly bestow on them Consistency and Substance. For from hence exist either Liquids or Solids, Small things or Great. For Water and Earth fill the little spaces that are empty, through the Combination of the rest, with their coming between, and amplifie and enlarge the lineaments of the Body, otherwise too short and contracted.

4. Water is the chiefest Vehicle of Spirit and Sulphur, by whose intervention, they consociate one with another, and with Salt; for the other Principles, being dissolved by a watery humour, or at least diluted, continue in motion, without which they grow stiff, as congealed things.

When Water is wanting, the active Principles meet together too strictly, and mutually rub against, and consume themselves; and when for this reason, the suppliment of food is cut off, the Body grows withered. If humidity abounds to much, these Elements are estranged or dissociated too much one from the other, wherefore the subject becomes sluggish and slow, and of less

leſs efficacy, and unapt for motion. Beſides, Bodies too moiſt, are lyable very much to rottenneſs and Corruption; becauſe from too much Humidity the Combination of Spirit, and Sulphur, and Salt, is too loolly effected; that they do not mutually embrace one another, nor are retained with their embracement, in the ſubject. Indeed Water abounding, eaſily evaporates, and then the frame of the mixture being looſened, and the doors ſet open, Spirit and Sulphur eaſily break forth, the way being made, and leave the ſubject, as it were vapid, or made ſharp with Salt: For from hence, the infuſions of Vegetables, Decoctions, Juices of Herbs, and all Liquid preparations, if the quantity of Water be greater then the reſt of the Principles, and improportionate, quickly Corrupt.

Water is moſt eaſily drawn forth out of every thing by Diſtillation, for when Spirit and Sulphur are often intangled with nets of Salt or Earth, they hardly let go their embraces, and are not obedient but to a more intenſe heat, and oftentimes require a previous Putrefaction. Water moſt eaſily, and often with no labour, is driven out of every Body; but moſt often it ſnatches in its flying away, ſome more looſe Particles of Spirit and Sulphur, and carries them with it ſelf, forth of doors.

5. As the interjection of Water in Liquids, ſo of Earth in Solids, fills the empty little Spaces and Vacuities, left by other Principles; for theſe hinder the active Principles from a too ſtreight embrace, whereby they ſhould rub againſt themſelves, and cleave one to another; alſo by its thickneſs, it retains too Volatile things: beſides, it inlarges the due ſubſtance, and magnitude in Bodies.

The more that Earth abounds in any thing, it is ſo much the leſs active, but of longer duration: Hence Minerals endure a long while, then next the greater Trees; in the mean time Animals, and the more ſlender Plants, are but of ſhort age.

In Diſtillations, Earth aſcends the Alembic, almoſt not at all, or but in a very little quantity: for the moſt part it is left, with a portion of Salt, for a *Caput Mortuum*, or Dead Head; therefore it is called *Terra Damnata*, or damned Earth: becauſe, when the other Principles are freed, the Priſon being as it were broken, this is ſtill detained: beſides Earth being deprived of the Company of the reſt, is of no Uſe, nor capable of change, or exaltation.

Thus much for the Elements or Principles of Natural things, conſidered apart, and by themſeves. It follows, that ſome of their Affinities and Conjugations be unfolded: becauſe theſe very ſtrictly cohere with thoſe, and very hardly or not at all are joyned with others. Out of the mutual Combination of ſome, and diſagreement of others, various Affections ariſe, the knowledg of which gives no little Light to the Doctrine of Fermentation.

There is a certain Kindred and Similitude of parts, between Spirit and Sulphur, which are agil or light, and eaſily to be diſſipated in both; wherefore, Spirit being driven forth of the Body, draws abundantly with it Sulpureous Particles, as is diſcerned in Spirituous Liquors Diſtilled out of any thing; to ſome of which if you mingle Water, the Liquor appears as it were troubled with precipitated Sulphur; but the Spirit without the Sulphur is undiſcernably mixed with the Water, which however by reaſon of its Volatility, may be alſo eaſily drawn away and ſeparated by Diſtillation.

Altho Spirit and Sulphur are Principles very reſembling, and (becauſe of of a ready motion) either are inflameable, yet they are not one and the ſame, as is aſſerted by ſome: For Sulphur Copiouſly ſubſiſts in Bodies almoſt deſtitute of Spirit, to wit, in common Sulphur, Antimony, and other Minerals; in which its Particles are very fixed, and of their own nature, almoſt immoveable, which is very far from the Nature of Spirits: For they abounding in any mixture, never lye idle, and alwayes in motion, bring various alterations to the Subject where they dwell; then if they abound in ſtrength, they eaſily and without tumult carry themſelves forth of doors of their own accord. But Sulphur, altho it abound, doth not eaſily evaporate, but hath need of a ſtrong heat, or an actual fire, that may make a way for it; and laſtly, it breaks forth not without a ſtink or burning: yea, if you endeavour to Diſtill Oyly and Fat things, although very Sulphureous, with a moderate Fire, they are wont to yield a Liquor only Wateriſh, and not inflameable; but if we Provoke generous Wine, which ſwells with Spirit, by the gentle heat of a Bath, a moſt burning Water will Still forth, and apt wholly to be inflamed.

Spirit is not preſently joyned with Salt: For Sugar and Salts are ſcarcely diſſolved by the rectified Spirit of Wine, but are after a manner aſſociated by a long digeſtion and circulation; as is perceived in the Volatile Salt of Animals, or Tincture drawn forth from the Salts of Herbs, or of Minerals, by the Spirit of Wine. If that Spirits excel in plenty, and virtue, they aſſume to themſelves, and Volatiliſe the Saline Particles. And therefore the Salt contained in the Juice or blood of Animals, being aſſociated with Spirit, is volatiliſed: Alſo the Spirit of Wine, being Diſtilled by many Cohalations, with the fixed Salt of Herbs, renders it Volatile, and makes it paſs through the Alembic; but if the power of the Salt be greater, it tames the Spirit and fixes it. Hence the blood, being become Salt, by means of an ill dyet, becomes leſs Spirituous. Fixed Salts, and the Oyl of Vitriol fix the Spirits, grown too volatile and unbridled, and Coagulate the Spirit of Wine it ſelf.

But

But Sulphur is a more fit ſubject of the Spirit, by the coming between of which it eaſily is united with Salt and the other Principles; and as Spirit beſt agrees with Sulphur and Water, ſo Sulphur intimately cleaves to Earth and Salt.

As to Sulphur, beſides its affinity with Spirit, it hath a great relation with Salt it ſelf, to the volatiliſation of which it doth not a little help: wherefore in Bodies which abound with a volatile Salt, there is found plenty of Sulphur, as in Amber, Soot, Horns and Bones, as alſo in the excrements of living Creatures; where Salt and Sulphur are in motion, and evaporate from the ſubject, a very ſtinking ſmell is ſent forth; for Sulphur being ſharpned with Salt, pricks more ſtrongly the ſenſory, and ſtrikes it with its ſharpneſs; in the mean time, Sulphur exhaling with Spirit, both pleaſes the ſenſe, and excites a very pleaſant ſmell.

Sulphur is as it were diſtracted between Spirit and Salt, and adheres at once to both parties. In the Diſtillation of Amber, Turpentine, Harts-Horn, and the like, a certain leſſer part of Sulphur, being united to Spirit, firſt aſcends and cauſes a Yellow Oyl, or clear Liquor of a grateful ſmell: the other part of Sulphur, being joyned to the Salt, is driven forth in the ſecond place, and is Diſtilled with a moſt ſtinking ſmell, in the form of a red or black Oyl: In like manner, in the Circulation of the Blood, a pure and delicate portion of Sulphur, being mixed with the Spirit, ſupplies both the Animal and Vital Spirit with matter; the other more thick part, being Boyled and Roſted with Salt, is laid up in the Choledock Veſſels (or belonging to Choler) as it were a certain excrement ſeperated from the Blood. As Spirit does not eaſily Cohere with Salt, ſo Sulphur does not with Water: wherefore Fat and Oyly things, as alſo Gums and Sulphureous Reſines, either ſwim upon the Water, or ſink down to its bottom. But Sulpureous things, Salt coming between, are commixed with a Watery Liquor, as we ſee Oyls imbued with Sugar or Salt, to be diſſolved in common Water, which otherwiſe would flow ſeparate.

Sulphur is not ſo tractable in Diſtillation, as Spirit, Water or Salt: for the Particles of this, being very Viſcous, ſtick together among themſelves, and alſo to others, that they cannot eaſily be pulled from their embrace. Hence among Sulpureous things, there are ſome, which are not forced, but by a ſtrong and burning heat, into a ſtinking Oyl, and very empyreumatick, or ſmelling of Fire: But others, more pertinaciouſly cleaving together, are not to be looſened by Diſtillation, but are only broken into integral parts; and ſo aſcend under the form of a dry Breath, as common Sulphur, Benzoin, Camphor, and the like.

Salt, beſides its affinity with Sulphur, is alſo moſt ſtrictly united with Earth; wherefore, Stones, and the more hard Minerals, conſiſt chiefly of Salt and Earth. The Acid Spirits of Minerals, (which are only Salts reſolved into Liquor by Diſtillation) if at laſt they be poured on the *Caput Mortuum*, Cohere with a ſtrict embrace to it, that there will be need of a moſt ſtrong Fire, to drive them forth again. Alſo in Glaſs, the union of Salt and Earth is ſo ſtrictly made, that it will not ſuffer a Divorce by any means. Salt alſo is moſt eaſily Diſſolved in Water; and it melts of its own accord, in a moiſt Air: and theſe are as eaſily ſeperated one from another.

By reaſon of theſe Combinations, theſe Principles have got various Appellations and not Congruous in their own Nature to themſelves: For Sulphur, foraſmuch as it is Aſſociated with Spirit, is called pure nnd ſweet; when with Salt, impure and ſtinking, for as much as with Salt and Earth, it is called thick and Earthly; when the Spirit aſſumes to it ſelf Sulphureous Particles in a moderate quantity, it is ſeen to be ſweet; when ſaline, ſharp; when both, bitter. Salt has a diverſe diſpoſition, and is known by many names, by reaſon of its various mixture with the other Elements, and chiefly with Earth; for beſides the Titles of Fluid, Fixed, Volatile, for this reaſon it is termed Marine, Aluminous, Nitrous, Vitriolick, Armoniack, or of ſome other kind. By ſome, theſe kind of Conjugations are eſteemed, but wrongfully, as ſo many divers Principles, when they are but ſimple mixtures, by the coming together of the firſt Element, and being looſened by Diſtillation they openly ſhew their Race, from whence they are. For all ſalts whatſoever being driven into a Flux by the Fire, ſhew Liquors very near of Kin one to another, to wit, Acetous: by the like means Spirit and Sulphur are compelled to put off their masks, and to reſume the Native Species common to each.

And ſo much for the Principles of Natural Things, and of their Affections and Conjunctions. It is abundantly manifeſt, that theſe kind of Subſtances are in every Body, (beſides the Analyſes of Bodies Chymically inſtituted) alſo from the Mutations, and effects of Things, which happen of their own Nature. When Muſt is ripened into Wine, is not Spirit, a Sulphureous part, alſo Salt, and Earth Conſpicuous to our Taſt and Eyes, beſides the Water, Liquor? Alſo the Juice of every Plant being exalted by Digeſtion, exhibits the ſame ſincere, and is as it were diſtinct: what is greater, things ſubject to the Flame, when they ſeem to be burnt, and reduced almoſt to nothing, they go into theſe kind of Particles; beſides the ſalt remaining in the Aſhes, the ſmoke and Flame grow together into ſoot as it were a Meteor, in which are comprehended together, Spirit, Sulphur, Salt, Water, and Earth, as it were in a certain compendium of the mixture. For the active Principles abound in Soot, more than in any other inanimate Body.

But

But becauſe with ſome there hath ſpread a certain ſuſpition, that thoſe our Principles, chiefly the Saline and Sulphureous, are to be produced for the moſt part by Fire, and are no wayes to be found in mixt things, unleſs after the coming between of that: I will witneſs to you in ſome inſtances, that the thing is plainly otherwiſe. Concerning the firſt, It is commonly known, that the Aſhes of every Plant, being once Elixivated, or made into a Lye, if it be afterwards Calcined, will not yield any thing of Salt; beſides if Concretes being Diſtilled, Exhale or Breath forth a very ſharp or acid Liquor, their Calx is not ſaltiſh; and on the contrary when the Salt being Volatiliſed or brought to a Flux, aſcends the Alembic, you ſhall ſeek for it in vain in the dead head. To prove the exiſtency of the ſulphureous Principle in Vegetables, take Guaiacum, or a peice of any other ponderous Wood, & being put into a Glaſs Retort, draw it forth by degrees; it ſhall exhibit, together with an Acid Liquor (which Water is ſaltiſh) in great quantity, a blackiſh Oyl (which part of it is ſulphureous.) It appears from hence that this was in the Body before the Diſtilling, and in no wiſe produced by its Operation, becauſe if you proceed after another Manner, that the Sulphur may be taken out of the Concrete before Diſtillation, the Liquor that comes forth will be almoſt wholly deprived of its Oylineſs: Wherefore, if you pour Spirit of Wine to thoſe Chips of Wood, it will Extract in great quantity, by this Menſtruum, a pure Reſine, which is the ſulphureous part it ſelf; then if you Diſtill (as before) in a Retort, the remaining Chips being waſhed in common Water, and dryed, you will have a very little Oyl only. What is more to be admired, and confirms alſo more fully the truth of this kind of Origination, ſome Bodies, which being almoſt deſtitute of Spirit and Sulphur (becauſe chiefly Volatile) conſiſt chiefly of Salt, Earth and Water, are ſeparated into the Elements by Diſtillation: the ſame mixture in number, and wholly known by the ſame accidents, is reſtored to them, being mingled together again; for example, if you diſtill Vitriol in a Reverberating Furnace, you will have a Phlegm almoſt inſipid, or a Watery part, then a Liquor very ſoure, or a Salt having gotten a Flux, and in the bottom, a Red Earth, and finely Purpled: this being rightly performed, if the two Diſtilled Liquors be poured to the dead head, you ſhall have the ſame Vitriol as you had before, and again revived, in the ſame Colour, Taſt, yea and almoſt in weight. In like manner you may proceed, with the ſame ſucceſs, with Nitre, Sea-Salt, Salt of Tartar, and perhaps with Alum and other Minerals; ſo that thoſe Concretes, which conſiſt of fixed and ſtable Elements, may like a Mechanick Engine be pulled into peices, and preſently without hurting the Machine, be reſtored or made whole. But there is enough ſpoken concerning the Principles of Natural Bodies. Theſe being thus premiſed, we will proceed to the thing propoſed in the beginning, to wit, the Doctrine of Fermentation.

CHAP. III.

What Fermentation is: Its Diviſion as to the Subjects; and firſt of Minerals.

FErmentation is an inteſtine motion of Particles, or the Principles of every Body, either tending to the Perfection of the ſame Body, or becauſe of its change into another. For the Elementary Particles being ſtirred up into motion, either of their own accord or Nature, or occaſionally, do wonderfully move themſelves, and are moved; do lay hold of, and obvolve one another: the ſubtil and more active, unfold themſelves on every ſide, and endeavour to fly away; which notwithſtanding being intangled, by others more thick, are detained in their flying away. Again, the more thick themſelves, are very much brought under by the endeavour and Expanſion of the more Subtil, and are attenuated, until each of them being brought to their height and exaltations, they either frame the due perfection in the ſubject, or compleat the Alterations and Mutations deſigned by Nature.

Fermentation is an action or motion meerly Natural, and what doth perform it, are only Particles Naturally implanted in the Concrete; yet as to the ſubjects in which they are found, it is wont to be variouſly diſtinguiſhed. And either things of Nature are ſaid to Ferment in a threefold Family, of Minerals, Vegetables and Animals; or the Works of Art, to wit, when Actives are applyed to Paſſives by an outward Agent. Though the Term and Conſideration of Fermentation, are chiefly due to Artificial things, and things made by Hand; yet it will not be from the purpoſe, to ſpeak firſt ſomething of Natural Things, that a Compariſon being made of either, the Truth of our Hypotheſis, and the certainty of the Principles may be confirmed. But this only lightly by the way, in this place I ſhall paſs over, becauſe their more full handling belongs to Phyſiology, or the Diſcourſe of Natural or Phyſical Things.

In

In the first place, as to Minerals, altho in the bowels of the Earth, the Fermentation is less conspicuous than in the Superficies, yet it easily appears that the Elementary Particles, or the Fermentative Principles, are included in the depth of the Earth, as in a certain pregnant Womb: which there constitute Concretes, and things gathered together, by strict Embraces, the Productions of Minerals; but being loosned, and moved in the Bosom of the Earth, or exhaled upwards, cause the appearances of Meteors.

First, The Generation of the more hard Minerals, induces rather Congelation than Fermentation; because indeed these Principles, growing together in every Subject, are so fixed, and as it were bound together in Bonds, that they are not able any wayes to move themselves, or to depart one from another. This kind of fixation chiefly depends on the plenty and greater proportion of Salt and Earth (sometimes with an addition of sulphur) than there is of spirit or water, to wit, salt and earth, being most smally broken, and resolved even into a Vapour, lay hold of one another, and stiffen into a hard matter, and at last not to be loosned; almost after the same manner as making of Glass, and the burning of Bricks and Earthen Ware, are performed. For Glass consists of Salt and Earth, which when broken into most small bits, by a very intense Fire, they suffer a flux, they mutually lay hold of one another, and so strictly and intimately come together, that they are never to be parted. Glass is more fragil, or easy to be broken, then Earthen Pots, or Minerals, because it has a greater plenty of Salt, than of Earth, which is more plentiful in Earthen Ware, and in Minerals: To some of which, also happens a modicum of Sulphur, and for that reason they are more tenacious and ductil; as is to be observed in Metals, when in the mean time stones, and what contain little of Sulphur, are fragil, and apt by every stroke to fly to peices. In Vitrification there is need of a violent Fire, for the fusion of the Salt and the Earth (whose Particles, as is commonly said, are the Pestles of the Chymists) but within the Bowels of the Earth, there is not required such a fusion of Fire for the Concretion of Minerals, because Salt and Sulphur exist, being naturally resolved into most simple Particles; which, when they lay hold on the Earth, easily stiffen into Metal, or into a stony hardness. There are some Fountains found out, which, for that they flow with a primitive Salt, and resolved into small Particles, whatever Bodies are immersed therein, they cause them presently to become stony. We have read also, of Men changed into Stones, yea a whole City to have been stiffened into a stony substance, by the Air, or by some Vapour, brought forth of the Earth: The Faith of which thing is left to the Authors.

Meteors are made out of the same Principles by which Minerals are made, and conceived almost in the same Womb: but loosned from Concretion wandring here and there, and diversly fluctuating: or which being included in Subterraneous Vaults, and there moved, produce divers Springings up of Fountains, or ebullitions of hot Vapours; or exhaling from the Dens of the Earth, and being mixt with Airy little Bodies, they cause within the Region of the Atmo-Sphear, as it were a diverse fashioned Landskip, of Clouds, Winds, and the appearances of other things, in the Superficies of the Earth, or on high: in either there are highly active Principles chiefly Salt and Sulphur. Spirits are either deficient in Meteors, even as in Minerals, or are found only in a very small quantity or proportion: to wit, they are almost wholly excluded from these, by reason of the strict frame of the subject, which doth not easily yeild space and passage for their motion; also they abstain from those (*viz.* Meteors) by reason of the lax, and wholly loose structure of Matter, from whence they, who are mighty in swiftness, easily break forth, and desire to fly away.

Within the Bosom of the Earth, the Saline Particles being loosned, even into a Vapour, and then kneaded with an Earthy Matter or the moistening of Waters, they cause Eruptions of Fountains, and Acidulous or Spaw Waters, which resemble the disposition of Vitriol, Alum, Nitre, sometimes of Iron or Copper. Also the Sulphureous little Bodies being loosned, and gathered together, enkindle an Heat, and sometimes Subterraneous Fires; by whose Breaths the Dens and Caverns being made Hot, like an Hot-House, whilst the Watery humours pass through them, they from thence conceive their Heat, and supply the Springs of Hot Fountains for Bathes.

In like manner, in this visible and Ethereal World, Vapors both sulphureous and saline, and of a diverse Kind and Nature, perpetually breath forth, and are diffused through the whole Region of Air. From hence the diversity of Winds, the vicissitudes of Cold and Heat, Rain, Snow, Hail, Dew, and hoar Frost, and what are of this Nature, have their Origine. Concerning the particular Instances of these, the famous *Gassendus* may be consulted; who, in his *Epicurean* Philosophy, most aptly deduces the Phænomena, almost of all Meteors, and the Reasons of them, from the Exhalations of Sulphur and Salts, either Nitrous, Vitriolick, Aluminous or Almoniack.

CHAP. IV.

Of Fermentation for as much as is obſerved in Vegetables.

IN Vegetables Fermentation is yet more plainly diſcerned; for whilſt they Bud forth, Grow, Flower, bear Fruit, Ripen, Decline and Die, we may obſerve the divers motions of Particles or Principles, their various Habits and Tempers. I intend not here to deſcribe the ſeveral ways and proceedings of theſe. It will be ſufficient, for the unfolding the Doctrine of Fermentation, to take notice of ſome chief Inſtances concerning this Subject.

It is manifeſt by dayly Experience, that all Plants whatſoever, expoſed to a Spagyrical or Chymical Operation, may with little labour, be reſolved into the aforeſaid five-fold Elements: But in ſome there is found a greater plenty of ſalt, in others of ſulphur; in ſome ſpirits abound: Water and Earth are in moſt proportionated according to the Bulk and Magnitude of the thing. Plants, in which ſalt abounds, with a mean of ſulphur, and a little quantity of ſpirits, are for the moſt part of long Age, ſomewhat big, or flouriſh all the Winter, or though their Leaves fall, they keep a Nutricious Juice under the Bark: Of which ſort are the Oak, Aſh, Elm, Box-Tree, and all ponderous Woods and Shrubs.

In ſome ſulphur abounds, with a little ſalt and ſpirit, as are the Pine, the Firr-Tree, Cyprus-Tree, Juniper, Ivy, Olive, Cedar, and Myrtle-Trees, and all reſinous Plants; which for the moſt part have a ſweet ſmell, and are perpetually green, by reaſon the Juice wherewith they are nouriſhed, is viſcous, and not eaſily to be diſſipated. In others, beſides plenty of ſalt and ſulphur, ſpirits alſo are found in a greater proportion; as are Fruit-bearing Trees, and eſpecially the Vine, from whoſe Fruit, the Juice being wrung out, and purified by Fermentation, grows very big with ſpirit. Of this Rank are Plants for the moſt part Medicinal; alſo ſuch as produce curious and odoriferous Flowers; but in ſome, Water and Earth luxuriate in too great a quantity above the other Elements, as in cold Plants, and ſuch as grow in too rank a ſoil.

The Germination of Plants happens after this manner, either it is made out of the Seed, Root, Trunk, or of its own Nature, from the naked Matrix of the Earth. Firſt, the ſpirit being ſhut up within, by the ambient Heat and Moiſture looſening the frame of the mixture, being looſened, it preſently endeavors to fly away; but being held back in its flight, by the more thick Particles of the reſt, ſtretches forth more largely its Den, and together with the other Principles, with which it is bound, thruſts forth on every ſide into length and breadth; even as a little bundle of Silk, being contracted into wrinkles and folds, is opened here and there; in the mean time, the little ſpaces left by the enlargement of the ſpirit, and as it were made hollow, are filled up by the next Matter, driven even into the Vacuities. And after this manner the Architect Spirit, with its Miniſters, ſalt and ſulphur, ſtill ſtretching forth it ſelf, like a Snail, frames for it ſelf an Houſe, whoſe Inhabitant it is, and by dilating it ſelf, ſtretches forth that, until at laſt it hath wrought the Plant into the due Bulk and Figure deſigned by Nature.

You may take notice, that the times of the year, for the Budding, Flowering, Ripening, and Decaying of Vegetables, are of great efficacy and virtue; all the Winter, the Womb of the Earth, as it were ſhut up, is almoſt barren; for the ſpirituous Particles, which are wont to actuate the reſt, and as it were to lead the Dance of Natural Motions, are either chaſed away by the Winters Cold, or being congealed in their ſubjects, are fixed, wherefore at this time Germination and Vegetation are very rare, unleſs that ſome irregulat Plants, which are compoſed of plenty of ſpirit, ſalt and ſulphur, dare to break forth. But in the Spring, when the Bowels of the Earth begin to be a little warm by the Vicinity of the Sun, preſently they are impregnated with a wonderful Fœcundity, and produce the effects of their ſeminality. Not only the ſuperficies of the Earth, but alſo the Water and Air, every where, grow big with ſpirituous particles, which, as it were, raiſe up from the dead the little Bodies of ſalt and ſulphur, and bring them into Motion: Therefore, beſides that the Plants Bud, the Juice and Blood of living Creatures is quicker, and more apt to abound. At this time the Birds and Fiſhes build their Neſts, and bring forth Eggs; alſo we may perceive in our ſelves the Blood to flow high in the Veſſels, and uſually to Ferment too much. For all things are then full of this Ethereal ſubſtance, and the whole Bulk of Nature, as it were, inſpired by a lively Fermentation, is abundantly fruitful of Motions and Generations. Yea, theſe our Principles, at firſt ſeparated and diſperſed one from another, led as it were by an Appetite of Copulation, enter into mutual Marriages, and being married together, almoſt by infinite Embraces, cauſe a moſt ample feeding and germination of the Herby State.

At

At the beginning of the Summer (and perhaps in ſome ſooner, in ſome later) when ſufficient time hath been granted for the ſtature and magnitude of every Plant, and that it is now come to the height of increaſe, it behoves Nature to perfect her Work, and to Cook and ripen the ſubſtance, as yet rude and undigeſted; wherefore the active Principles leiſurely extricate themſelves from the more thick, and creep forwards towards the top, there being placed with a mutual increaſe, they are formed into Flowers and Bloſſoms, from which at length (for that they are of a ſoft and light texture) ſpirit and ſulphur eaſily evaporate, and the frame of the mixture quickly decays: But Nature careful of the perpetuating every thing, when it cannot keep for ever the Individuum, is ſo provident, that the ſpecies may not wholly periſh: Wherefore ſhe inſtitutes new and more firm and laſting Combinations of ſpirit, ſalt and ſulphur; for ſhe ſelects from the whole ſubſtance of the Plant the more noble and highly active Particles; and theſe being gathered together with a little Earth and Water, ſhe forms in the Seed, as it were the Quinteſſences of every Plant; in the mean time, the Trunk, Leaves, Stalks, and the other Members of the Plant, being almoſt quite deprived of the active Principles, are much depauperated, and are of leſs Efficacy and Virtue.

About Autumn, after the Seeds are framed (as it were pledges left in memory of the Plant) the particles of ſpirits, ſalt and ſulphur which remain, being now placed in their ſtrength or exaltation, endeavour a Diſſolution and Departing one from another. And firſt of all, the ſpirits evaporate by degrees with the watery Humor, through the doors ſet open by the ſummer Sun, with which the more pure parts of the ſulphur make alſo their Journey; in the mean time, the ſalt, being fixed with the Earth and more thick ſulphur, is left behind; wherefore in moſt the Leaves fall at this time, and in thoſe of a tender and light conſtitution, the Principles are wholly diſſipated, and the Trunk and ſtalk, together with the Root, wholly die. In ſome, after the falling of the Seed with the Leaves, the ſtalks wither; in the mean time the Principles which may renew the Plant in the next Spring, are preſerved in the Root.

Alſo Winter coming on, the face of things is wholly changed; and the Elements, which in the Spring did affect to be joyned, and to marry one with another, ſeek nothing more than Divorces. The Spirits fly away from very many things, and wander in the Air; in the mean time the particles of ſalt and ſulphur lie as it were benummed and aſleep. Not only the Bodies of Vegetables, but of very many Animals, are left as it were dead all the Winter, till they are raiſed again to the Life by the Spirit, returning with the Vernal Sun, and as it were animated anew. But this little Branch being made concerning the Vegetation of Plants, it is now fit that we proceed on our Journey to Fermentation by the Rule of our before eſtabliſhed Method, to what is to be obſerved concerning the Parts and Humors of Living Creatures.

Chap. V.

Of things to be obſerved of Fermentation about Animals.

IT is ſo certain that the Bodies of Animals conſiſt of the aforeſaid Principles, that it wants no proof: For they ſo plentifully ſwell up with ſpirit, ſalt and ſulphur, that their Particles are obvious to the ſenſe; wherefore they are moved with a more ſwift motion, and more excellent ſenſes of Life and functions of Heat in the ſubjects in which they are implanted, are enlarged. It would be too much labour, and tedious here to deſcribe the ſeveral manners and proceſſes of Fermentations. The firſt beginnings of Life proceed from the Spirit Fermenting in the Heart, as it were in a certain little punct. The motion of this is not as in Vegetables, ſlow and inſenſible, and only to be known by their increaſing; but preſently becoming rapid, is conſpicuous to the Eyes; becauſe the Spirit leaping from the punct, as from a Priſon, being ſtirred, and having obtained the Vehicle of Blood, ſwiftly runs forth; and leaping forth, it cannot wholly fly away, it makes hollow ſpaces for it ſelf in the thick ſubſtance, in which it is included, for its excurſion, being compelled ſome other way backward. Laſtly, being returned to the Heart, it Ferments the more, wherefore it ſtretches forth further the ſpaces of its Excurſion, and ſo eaſily makes an hollow way for its return back; and after this manner, for the carrying about the Blood, Arteries and Veins, as Channels and Rivulets are framed through all the parts of the Body: and on ſuch a Viciſſitude of Motion, or Reciprocation, depends the life of living Creatures, which that Nature might preſerve a long while, ſhe placed the Ferment in the Heart, by whoſe inſtinct, or endeavour, the Blood grows impetuouſly Hot, and as it were enkindled into a Flame by its Deflagration, diffuſes the *effluvia* of its Heat round about on every ſide: for by the Fermentation, or Accenſion which the Blood ſuffers

in the Bosom of the Heart, very many Particles of Spirit, Salt and Sulphur, endeavour to break forth from its loosned frame: by which being much rarified, and like Water boyling over a fire, the moved and boyling Blood is carried through the Vessels, not without great Tumult and Turgescency. We would speak more in this place, both of the Natural Fermentation of the Blood, and the Feaverish, but that we reserve this Consideration for a peculiar Tract, where we Treat of Feavers.

Besides this Ferment constituted in the Chimny of the Heart, upon which the motion and heat of the Blood very much depends, there are others laid up every where in the Bowels, of a diverse disposition, by the help of which, both the Chyle (which is the Rudiment or Beginning of the Blood) and the Animal Spirits, its Quintessence, are truly framed. There are others also which serve for the perfecting the Blood, transmuting it into other Liquors, and freeing it from Excrementitious Matter: It will be too far from our proposed method, to wander, to insist upon each of these, and to reap anothers Harvest: Wherefore I will only add in this place, some select instances, which may illustrate the Doctrine of Fermentation.

It is commonly received, that the Concoction of the Chyle, in the Ventricle, is made by the means of a certain Acid Ferment: That such a thing is, the Acid Belching in a full Stomach, and the want of it in the loss of Stomach, in Feaverish and Dysenterical people do testifie, *&c.* and its restitution a sign of Health: to which may be added this Observation, Chalybeat Medicines being taken at the Mouth, a little after excite a Sulphureous savour in the Throat, as if hard rosted Eggs had been eaten: which seems wholly to be made by the Acid Ferment of the Ventricle, gnawing the Iron, even as Spirit of Vitriol, being sprinkled upon the fileings of Steel, excites such a stinking and Sulphureous Odor. Some say this Ferment is breathed into the Stomach from the Spleen, but by what means that may be done, doth not yet appear by Anatomical Observation. It seems not improbable that this Ferment is implanted in the Ventricle, that it is only made by some remains of the perfected Chyle, which fixed in the folds of the Ventricle, and there growing sowr, puts on the Nature of Ferment; even as a portion of Dough being fermented or levened, and kept to a sowrness, becomes a convenient Ferment or Leven, for the making of Bread. In like manner this kind of Acid humour being prepared from the Aliments, and long carried in the Ventricle, promotes the Concoction, and subaction or subduing of the Food; for Acid things, which are full of Salt, carried out to a Flux, excellently conduce both to the Fermenting and Dissolving of Bodies: Wherefore by the action of this, Salt and Sulphur, with which eatable things very much abound, are broken in the Ventricle, and are reduced into very small parts. The Chyle being after this manner Fermented, acquires a Milky colour, by reason that the Sulphureous Particles are dissolved together with the Saline, and mixed with the Acid Ferment. For if you pour an Acetous humour to any Liquor impregnated with Sulphur and volatile Salt, it presently grows white like Milk; as may be discerned in the preparing the Milk of Sulphur, or the Resinous extracts of Vegetables. Yea, the Spirits of Harts-Horn, or Soot, being very full of Volatile Salt, if they be poured to any Acid Liquor, or simple Water, acquire a Milky colour.

Concerning this Ferment hid in the folds of the Ventricle, it is observed, that it is after various manners, and changes the Aliments by diverse means: for tho in a sound Constitution it is indifferently Acid, and chiefly owes its force and energie to the Salt being brought to a Flux; yet it often declines from this laudable condition, and contains in it self either too much of sowrness, or less than it ought to have: In the former Case, where the Salt hath got too sowr a Dominion, all things taken in, (the Saline Particles being carried forth to a Flux, and the rest unduly brought under) presently grow sowr; as most often happens in Hypocondriack Distempers: on the other side, where the Volatile Principles obtain the first place, (Fermentation being too hastily made) the Sulphureous parts of the Chyle are suddenly, and as it were forceably exalted; and the unconcocted of the Saline, pass into Choler: which ordinarily happens to those abounding with bitter Choler. They therefore who have the Ventricle affected after this latter manner, sweet and fat meats being eaten, they are troubled with a bitter and bilious Taste: Again, they who suffer the contrary disposition, altho they eat the most simple food, send forth plentifully Acid and stinking belchings: and indeed this seems to come to pass even after the same manner, as when a little too much Yest is put to the Batch of Dough, it becomes bitter; or when too great a Portion of sowr Ferment, or Leven is put to the same Dough, the Bread from thence contracts a mighty sowrness.

As the Blood in the Heart, and appending Vessels, the Chyle in the Ventricle, so the Animal Spirit is wrought in the Brain, whose Original and Motions are very much in the dark. Neither doth it plainly appear, as to the Animal Spirit, by what workman it is prepared, nor by what Channels it is carried, at a distance, quicker than the twinkling of an Eye. But it seems to me that the Brain with Scull over it, and the appending Nerves, represent the little Head or Glassie Alembic, with a Spunge laid upon it, as we use to do for the highly rectifying of the Spirit of Wine: for truly the Blood when Rarified by Heat, is carried from the Chimny of the Heart, to the Head, even as the Spirit of Wine boyling in the Cucurbit, and being re-

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ſolved into Vapour, is elevated into the Alembic; where the Spunge covering all the opening of the Hole, only tranſmits or ſuffers to paſs though the more penetrating and very ſubtil Spirits, and carries them to the ſnout of the Alembic: in the mean time, the more thick Particles are ſtayed, and hindred from paſſing. Not unlike this manner, the Blood being delated into the Head, its Spirituous, Volatile, and ſubtil Particles, being reſtrained within by the Skull, and its *Menynges*, as by an Alembic, are drunk up by the ſpungy ſubſtance of the Brain, and there being made more noble or excellent, are derived into the Nerves, as ſo many ſnouts hanging to it. In the mean time the more craſs or thick Particles of the Blood, being hindred from entring, are carried back by Circulation: But the highly agil and ſubtil Spirits enter the ſmalleſt and ſcarcely at all open Pores of the Brain and Nerves, and run through them with a wonderful ſwiftneſs: for there is need only of ſuch Receptacles and Channels, for the Animal Spirit, in which there are none, or at leaſt very ſmall cavities or holes, otherwiſe the blood or excrementitious humours, their followers and companions would not be excluded. Alſo, beſides, if theſe Spirits ſhould run about through too open and looſe ſpaces, being eaſily diſſipated, they would fly away: wherefore, when there is need of a Pipe for the tranſmitting of blood, or ſerous water, the Spirit of Wine runs rapidly through the ſecret paſſages of the Inſtrument or Leather. Neither doth the more ſtrict frame of the Brain and Nerves ſerve only for the ſtraining of the ſubtil from the thick, and the pure from the impure; but alſo that ſpirituous and moſt ſubtil Liquor, being as it were diſtilled from the blood, gets yet a farther Perfection in the Brain; for there being inſpired by a certain Ferment, whereby it is yet more volatiliſed, it is made more fit for the performing the offices of motion and ſenſe. Becauſe the ſubſtance of the Brain is exceeding full of a Volatile Salt, which is of great Virtue for the ſharpning and ſubtilizing the Spirits; therefore the Spirits of Harts-Horn, or of Soot, are far more penetrating than Spirits of Wine.

The Seminal Veſſels and Genital Parts, do ſo ſwell up with Fermentative Particles, that there is nothing more: here Spirit, Salt, and Sulphur being together compacted, and highly exalted, ſeem in the Seed to be reduced as it were into a moſt noble Elixir. Theſe kind of active Principles do not only Ferment in the Womb, for the forming of the Child or Young ones, but alſo as it were, with a living Ferment, they inſpire through all the Body, the whole Maſs of blood, that it may be more Volatile, and more ſharply hot: Wherefore in Women who have the Ferment of the Womb in good order, their face is furniſhed with a curious and nouriſhing colour, their heat is more lively and copious; moreover, the maſs of blood growing too rank, there is need of emptying it every Month by the flux of their Courſes; but when this Fermentation from the Womb is wanting, both Virgins and Women become Pale, and and as it were without blood, ſhort-winded, and unfit for any motion. Alſo in men, from the ſeminal Ferment, happen abundance of heat, great ſtrength, a ſounding Voice, and a manly eruption of beard and hair; by reaſon of the defect of this, men grow womaniſh, to wit, a ſmall Voice, weak Heat, and want of beard are cauſed.

Since we Treat of Ferments, which are found in the Animal Body, we may here opportunely inquire, what is the uſe of the Spleen: concerning which all good things are ſaid by ſome, that it is as it were another Liver, and ſerves for the making of blood for the *Viſcera* of the lower belly: it is by others reputed to be of a moſt vile uſe; that it is the Sink or Jakes, into which the feculencies of the blood are caſt. By reaſon of its ſtructure, we make this ſort of conjecture; becauſe the Arteries, do carry the blood to this, and the Veins bring it away, neither any other thing is carried in, or conveyed out; and for that its ſubſtance is filled with black, and ſtagnating blood, it ſeems that it is as it were a ſtore-houſe for the receiving of the earthy and muddy part of the blood; which afterwards, being exalted into the Nature of a Ferment, is carried back to the blood for the heating of it: Wherefore, while the blood being carried by the Arteries, enters the Spleen, ſomething is drawn from it, to wit, the muddy and Terreſtial Particles, which are as it were the dregs, and *Caput Mortuum* of the blood; that by this means the whole Maſs of Blood, might be freed from the Melancholick or Atrabilous Juice; which is ſeparated in the Spleen, even as yellow Bile or Choler, is in the Liver: wherefore, for the moſt part the Spleen is of a black or blewiſh colour, by reaſon of the feculencies or dregs there laid up. But as this Juice depoſited in the Milt or Spleen, is not altogether unprofitable, but by reaſon of the plenty of fixed ſalt, is of a very Fermenting Nature; it is not preſently, as the Choler, caſt into the ſink, but is further Cooked in the Spleen, and being exalted goes into a Ferment; which being laſtly committed to the blood, promotes its motion and Volatiliſation: Wherefore, as ſomething is drawn from the blood, entring the Spleen by the Arteries, to wit, the Crude Juice of Melancholly; ſo ſomething is continually added to the ſame, flowing back through the Veins, to wit, the ſame Juice concocted and exalted into the Nature of a Ferment: Even as Chymiſts, in Diſtilling, that the Liquor may be made better, ſeparate the ſubtile and ſpirituous parts, from the *Caput Mortuum*, and then pour them on it again; and this work they ſo often repeat, till the *Caput Mortuum*, or dead Head, is by frequent Diſtillation Volatilized, and the Liquor rightly exalted, even in all its Particles. That this is the uſe of the Spleen, is a ſign,

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for that this inward being ill affected, the blood either ferments too much, as in the Scorbutick and Hypocondriack Diſtempers; or if the Spleen be Obſtructed, or beſet with a Scirrhous Tumor, the blood is deſtitute of fit Fermentation, and cauſes the Dropſie, Cachexie or evil diſpoſition of the Body, or the Tympany.

As we aſſert, the Earth and muddy part of the blood, which conſiſts chiefly of Earth and fixed Salt, being ſeparated in the Spleen, to paſs there into a Ferment; ſo it ſeems not improbable, that alſo the Aduſt, or as it were the fiery part of the blood, to wit, the Yellow Bile, which conſiſts chiefly of Salt and Sulphur, being ſeparated in the Liver, and from thence tranſmitted to the inteſtines, ſerves for ſome uſe of Fermentation. For this being mixed with the Chyme or Juice, fallen from the Ventricle to the Inteſtines, makes it there to grow hot and ſwell up; whereby both the Elementary Particles are more overcome, and by reaſon of the Rarification or ſwelling up, the purer part is wrung forth into the Milky Veſſels, for the Nutritious Juice.

We are not only born and nouriſhed by the means of Ferments; but we alſo Dye: Every Diſeaſe acts its Tragedies by the ſtrength of ſome Ferment. For either the Sulphureous and Spirituous part of the blood, being too much carried forth, boyls up immoderately in the Veſſels, like Wine growing hot, and from thence Feavers of a divers kind and nature are enkindled: or ſometimes the Saline part of the blood, being too much carried forth, ſuffers a flux; and from thence it being made acid, auſtere, and ſometimes ſharp, is apt for various Coagulations; from which the Scurvy, Dropſie, Stone, Leproſie, and very many Chronical Diſeaſes ariſe.

Yea we alſo endeavour the Cure of Diſeaſes by the help of Fermentation: For to the preſerving or recovering the Health of man, the buſineſs of a Phyſician and a Vintner is almoſt the ſame: the blood and humours even as Wine, ought to be kept in an equal temper and motion of Fermentation; wherefore when the blood grows too hot, even as Wine, it is uſual to empty ſome out of the Veſſels, and to allay its Fervor with temperate things. If any extraneous or heterogeneous thing is mixed with it, unleſs growing hot of its own accord, it drives it forth of doors; Purging, Vomiting, and Sweating Medicines by ſhaking and fuſing the blood and humours, promote its ſecluſion: when that the blood is depauperated, and grows leſs hot than it ſhould do, Cardiacks, Digeſtives, and eſpecialy Chalybeats or ſteeled Medicines reſtore its vigor and Fermentation: no otherwiſe than Wines growing ſowr, or degenerating into a deadneſs or want of ſtrength, are mixed with more rich Lees, whereby they may Purge or grow turgid anew. I could eaſily unfold the Curatory intentions, as alſo the effects and operations of every Medicine, according to the Doctrine of Fermentation; but I deſign a particular Meditation for this thing: for the perfecting of which ſerious work, God willing, I have determined to add to the buſineſs of Medicine, as I hope, ſomething not unprofitable.

Having thus far wandered in the ſpacious field of Nature, we have beheld all things full of Fermentation; not only in the diſtinct Provinces of Minerals, Vegetables and Animals, do we diſcern the motions and effects of this, but alſo the whole Sublunary World, ſeems as if one and the ſame ſubſtance were planted, and very pregnant through the whole with Fermentative Particles; which in every Region and Corner of it, as little Emmits in a Mole-hill, are buſied in perpetual motion and agitation; they fly about here and there; ſometimes upwards, ſometimes downward they are hurried, they variouſly meet one another, aſſociate themſelves, and again depart aſunder; with a continual Viciſſitude they enter into divers Marriages, and ſuffer Divorces, on which the beginnings, the death, and tranſmutations of things depend. Theſe little Bodies do not only very much abound in the boſom of the Earth, or in the midſt of the waters, but they are eſpecially diffuſed the whole Atmoſphear of the Air in thick heaps. It is ſufficient that I have noted in this place, ſome examples in a word: I have not determined a more full ſpeculation of them here. It is time that we proceed from Phyſical things, to the works of Art.

CHAP. VI.

Of Fermentation, as it is performed in Artificial things.

IN the works of Art, ſo various and manifold proviſion of Fermentation is perceived, that it is altogether impoſſible to enumerate their ſeveral Species; or to reduce the divers inſtances of this to certain Claſſes or Heads of diſtribution. Making uſe of the third of the following method, we will ſubjoyn ſome examples, (which have happened to our obſervation) by whoſe rule, many others may be laid open.

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Concerning Fermentation, which is made in the Subjects, made by hand, or humane industry, these three things are chiefly to be considered,

First, of what Nature and Composition Bodies are, that are most fit for Fermentation, and which are less convenient for it.

Secondly, What things are requisite about Fermentation, to wit, what are wont to promote, or also to hinder its motion in every Subject.

Thirdly, How manifold the motion of Fermentation is, and the end of it; also what are the effects and alterations which follow it.

As to the first, That all Bodies, (when tending to perfection) may truely Ferment, they are required,

In the first place, That there be some parts loose and disjoyned; otherwise the Fermentative Particles will not be stretched forth, or move from place to place: Wherefore in the more hard compact things, or in viscous things, or too much boyled, or evaporated to a spissitude or dryness, Fermentation does not succeed. What are Liquid, as Wine, Beer, the Juices of Fruits and Herbs, easily and quickly swell up; next to these what are soft, tho they are of a thicker Consistency, as Bread, and most Eatable things, and Medicinal Compositions.

Secondly, It is required that there be an Heterogeneity of parts, or a confusion of all the Principles together; to wit, that some Particles do oppose others, and stir them into motion. For the more simple Bodies, in which one, or at most two Elements only are strong, with a very small proportion of the rest, are unapt to Ferment: because like Particles, or Symbolical Elements, lye benummed and quiet. But between the unlike, there arises presently a strife for domination, and some provoke others into motion.

Thirdly, There is a third condition, that there be neither too much Crudity, nor Maturity of parts, in the Body Fermenting. In the former, the active and subtil Particles are not easily extricated from the more thick, nor are brought into motion; as it appears in Juices, which are pressed forth from unripe fruit; also in Beer which is made of Barly or Mault, not come forth or germinated. In the latter the Particles being made too volatile, are not contained in the bond of the mixture, but presently evaporate, and dispose their Subjects to Putrefaction. Wherefore, Juice expressed from Summer fruits, or others too ripe, will not easily pass into Wine, but it will quickly Corrupt. And for this reason, extravasated blood, milk and urine, do not Ferment, but quickly putrifie.

As to the second thing proposed, there are many wayes by which Fermentation is either promoted or hindred. The first and chiefest, is the adding of a certain Ferment to the body Fermenting; the Particles of which, when being first placed in vigor and motion, may raise up the others, idle and sluggish, in the to-be-fermented Mass, and may drive them into motion. But there is a twofold Ferment; either absolute, which is the same kind of Body, in which the active Particles, being altogether placed in their vigor, are notable in motion, and so whilst they are committed to the Subject in Fermenting, snatch with them into motion other Particles of every kind, before sluggish: by this means Barm or Yest, beaten Eggs, and such like, stir up a Fermentation almost in every thing. Or the Ferment is respective, to wit, which consists of Particles, very much of one kind, which meeting other of another kind, in the Mass to be Fermented, grow hot with them, and so produce in the mixture a turgency or rising up of all the parts together. After this manner Saline Particles having gotten a Flux, grow very hot, with other Salines, either fixed or alchalisate; as appears when acetous Liquors are poured on Corrals, Harts-Horn, shells of Fishes; also when the Spirit of Vitriol, and the Salt of Tartar, are put together, a great ebullition is excited.

There are some accidents and external circumstances, which variously conduce, either to the provoking or hindring the motion of Fermentation; of which sort, are chiefly the condition of the Ambient Air, the placing or laying up of the Body Fermenting, and the means of conserving it.

The Southern Air (in which hot and humid Particles every where abound, which also easily entring any Bodies, obtain the force and place of a Ferment) impresses a notable motion of Fermentation in very many things: Wherefore in drinkable Liquors, it doth not only raise up at first, the force of effervescency or growing hot, but also for a long while after induces new swellings up in them being Fermented. On the contrary, the Cold and Northern Air, binds up, and very much fastens Bodies; and in very many things hinders the fusions, and flowings of the Elements, and oftentimes either hinders Fermentation from being stirred up, or restrains it being begun. Also the hot Summer Air, because it too much moves the active Principles, drives away the Spirits and subtile parts, exalts the Saline, and Sulphureous into a Flux, and so perverts their equal motion; and either the Sulphur or Salt being too much carried forth, it easily brings to Bodies a rancidness or putrefaction, or a mouldiness; which nothing favours the business of Fermentation.

It is a vulgar opinion, that some select times of the year, to wit, those in which the Vegetables of every Kind flower, cause anew the motion of Fermentation in the Juices, and other things,

things prepared of them, after they had fermented a long time before; ſo that Beer, when the Barly, and Wines, in the time that the Vine flowers, conceive riſings up, or new Fermentations: They ſay alſo, that Bread and Flowr, when the Wheat is in Flower, is wont to become ſooner muſty and mouldy; alſo that ſpots or ſtains of the Juices of Fruits, as the Mulberry, Blackberry, Rasberry, and ſuch like, being in Cloaths, are wont to be gotten forth again at that time when thoſe Fruits are ripe. Concerning theſe things, I ingenuouſly confeſs, that I have not made trial of them, by my own proper obſervation, ſo as to dare to affirm it for truth in every part; I will therefore lightly paſs them over, for it would both grieve and ſhame me (leſt I ſhould relate falſe things) to Philoſophize concerning doubtful things.

Concerning the laying up of the fermenting Body, theſe things are chiefly to be obſerved. When things firſt begin to Ferment, that they are not to be ſhut up in too cloſe Veſſels, neither while the Liquors are hot, are they to be put into Bottles or Casks; for the Particles at firſt boiling up, and as it were rarified, deſire a very large ſpace; wherefore the Fermentation of Wine or Beer is begun in open large Veſſels, but when they grow leſs hot, thoſe kind of Liquors, leſt the Particles being ſet and moved into motion too much, ſhould fly away from the Subject, they are kept beſt either in a cold Cellar, or cloſe Veſſels. In the preparation of Vinegar, we obſerve the contrary; to wit, it is wont to be placed in a hot place near the Chimney or Oven, or expoſed to the Suns-beams; to the end that the Vinous Spirit being depreſſed, the Saline part might be exalted into a Flux, and ſo might give a ſharpneſs to the Liquor. There is another Obſervation, that Liquors do ferment better in wooden Veſſels, than in Glaſs or Stone: for by long infuſion, ſome Saline little Bodies are got forth of the Wood, eſpecially the Oaken, which promote Fermentation.

As to the third thing propoſed concerning this thing, although to ſpeak properly, the motion of Fermentation is only a carrying forth of the Principles confuſed together, from a ſtate of Crudity towards Maturity; and the end of it is a tendency to the Perfection of every thing; yet Uſe or Cuſtom hath obtained, that this Word is attributed to very many other motions of Natural things, and includes other Ends and Effects, far different. Therefore when the Fermentative Particles in any Body, are greatly in motion, the Alterations which follow thereupon, may be in ſome reſpect referred to theſe three Claſſes.

Firſt, It either reſpects the Exaltation and Perfection of the Parts of the ſame Body; or the Reſolution and Corruption of them.

Secondly, Or the Diſſolution of the Parts of another Body, is intended; or the Præcipitation of thoſe looſned.

Thirdly, By the motion and action of theſe kind of Principles, a Coagulation, and alſo a Congelation, now of the ſame Parts, now of different Bodies, are induced. It remains, that we briefly run through every one of theſe Species of Natural Motions, and Ways or Manners of Fermentation.

CHAP. VII.

Of Fermentation, as it is ſeen in the Exaltation of Bodies, and Tendency to Perfection.

THE Exaltation of the Parts, is perceived beſt in Works, or in all things appointed for Human Uſe, foraſmuch as they get a greater Perfection and Vigor, by Fermentation; as chiefly Aliments and Medecines do; In many of theſe, we endeavour to carry forth the Spirituous Particles above the reſt, and ſo to procure in the mixture, a grateful ſweet taſte, and other agreeable Qualities; as we may obſerve in Bread, Beer, Wine, Cider, and many others: But in ſome, we ſtrive to exalt the Saline part, the Spirit being ſomewhat depreſſed; as in Vinegar, Meath, Broths; alſo in Sauce, Pickle, or in Preſerved things, which are made of Salt and ſharp Liquors. We rarely on purpoſe carry forth the Sulphureous part above the reſt. for from thence a ſtinking ſmell, and ungrateful rammiſhneſs are wont to happen to eatable things. Among Food ſet apart for mans Uſe, Bread, Beer, Wine and Cider have the firſt place; which owe moſtly, whatever they have of Virtue or Strength, to Fermentation.

Concerning the making of Bread, theſe things are chiefly to be obſerved: The Meal of Wheat or Barly, or of any other Grain, being kneaded with common water, is reduced to a Maſs, to be afterwards baked in an Oven. If there be nothing elſe added to this, it becomes forthwith heavy, and ponderous like Clay, clammy, and of an ingrateful taſte, and of difficult digeſtion; but if in the kneading it, there be added a Ferment, the Maſs preſently grows hot, the Bulk ſwells, and afterwards being baked, it is made light, ſpongy, of good digeſtion, and grateful

ful to the Taſte. If you deſire to know the reaſon of the difference, it is this; The meat of the Grain is imbued with a moderate proportion of Spirits, alſo of Salt and Sulphur; but the Particles of theſe are overwhelmed in the Maſs with a viſcous humidity, being kneaded with water; ſo that they move not themſelves mutually, nor are in motion; wherefore in the baking, ſome ſuperfluous humidity evaporates; what remains, is cleaving, viſcous, and becomes preſſed cloſe like Clay, and ponderous. But when a Ferment is mingled with the Mealy Maſs, the active Particles of the Ferment being firſt ſtirr'd up into motion, take hold of their Companions in the Mealy Maſs, and carry them with them into motion. By this means, whilſt ſome move others, they ſhortly are all ſtirred up into Fermentation; tumultuating here and there, they compaſs and run through the whole Paſte or Dough, they ſubtiliſe and attenuate the clammy and terrene parts, and they lift up the maſs, with the motion, and make it hollow, with little holes; which yet in the mean time, leſt it become too ſpongy, and whereby the parts made hollow, and attenuated, might more exactly be mixed, it is wrought with long kneading, then afterwards, before the Fermentation ceaſes, and before the hollowed parts ſink cloſe down, it is baked in the Oven. In the baking, the ſuperfluous moiſture evaporates, and moreover, very many Particles of Spirit, Salt, and Sulphur, fly away; wherefore, the maſs becomes lighter, and leſs ponderous, in the mean time, thoſe which remain in the Bread, being much exalted, and brought to maturity, cauſe in it a laudable conſiſtency, with a grateful ſmell, and taſt.

The Ferment commonly uſed, is a portion of the Mealy Maſs, and unbaked, which is kept, being imbued with Salt, to a ſowrueſs (it is called in *French*, *Levain*, becauſe it lifts up the Maſs) or the flowring of Beer, or Ale, called Yeſt or Barm; or for want of theſe the lees or dregs of Beer, or beaten Eggs, are made uſe of. In the mealy Ferment, the Saline Particles having gotten a flux, do chiefly predominate; as alſo in the fæces of Beer: wherefore the Bread Fermented by theſe, is made harſh and ſomewhat ſowr: In the mean time, Yeſt being very big with Spirit, Ferments the Bread more potently, and brings to the Maſs lightneſs, and a very grateful ſweetneſs. Beaten Eggs abound with Spirit and a Volatile Salt, and do yet more cauſe the Bread to Ferment, and render it more Spongy: without doubt there may be other kinds of Ferments uſed; for whatever are big and turgid with Spirit, or abound with Salt carried out to a Flux, ſeem to be fit enough for this uſe.

Sometimes the mealy Maſs is kneaded with Sulphureous matter, as Butter, Sewet, Fat, or ſuch like, which being baked in an Oven, while it is hot, it is ſeen to be light and ſpongy, (to wit, while the Sulphureous Particles are kept in motion by the heat contracted in the Oven) afterwards, when this Maſs grows cold, it becomes heavy, weighty, and very cloſe: to wit, the aſcititious heat being exhaled, the Sulphureous Particles, before carried forth, at length ſink down; and when the Particles of the reſt, not being excited into motion, the Maſs therefore becomes as it were Infermentated: For in theſe kind of Subjects the Sulphureous Particles, becauſe they are very viſcous, hinder the motion of the reſt, nor can they themſelves perſiſt in motion, longer than they are forced, by the actual heat.

Bread is ſometimes made of the flower of Wheat, or Barly, that is Germinated or Maulted, which without any Ferment added to it, becomes ſo exceeding hot, that it cannot be contained in a compacted maſs, but that in the baking it ſpreads abroad: the reaſon of which is, in ſuch Flower, by the Maulting it, the active Principles are before placed in their vigour, and exaltation; wherefore in the kneaded Maſs, when they are urged, by the heat of the Oven, they run forth inordinately, and force the more thick parts, hindring them, and as it were fling them down head-long. We have ſaid enough of making Bread; we will now paſs to Beer.

Beer is made of Mault or Barly, germinated and dryed, which is performed after this manner: Firſt, the Barly is put into common water for three days, that it may intumifie or ſwell, then (the water being let out from it) it is flung in a heap upon a dry floor, moving it twice or thrice a day, leſt it grow too hot, until it begins to germinate, or bud forth, or put out little ſhoots of Roots. Afterwards, by frequent caſting it about, it is hindred from germinating or ſpringing forth any farther, and laſtly, being lay'd upon a Kiln, it is made dry by roſting it; by this means, it yields a meat wonderfully ſweet.

The reaſon of this kind of proceſs is this; the Barly is permitted to ſpring forth, that its active Principles might be brought or ſet into their ſtrength, or exaltation: for when it germinates, the Spirit, Salt, and Sulphur, at firſt aſleep, and ſluggiſh, do ſwell up or grow big together, and their ſluggiſhneſs being caſt off, they are prepared to exerciſe their powers. The other preparations, hinder the Barly from germinating further, leſt that its Principles being very much looſned, ſhould exhale too much, and fly away from the Subject. The Meal of the Barly thus prepared grows ſweet, becauſe the active Principles are ſet in exaltation like Fruit brought to a maturity: wherefore alſo the Liquor impregnated with this Meal, grows very turgid or big with Spirituous and Fermentative Particles; when the ſimple decoction of Barly, ſcarce Ferments at all, nor is kept long, but that it becomes muſty, and inſipid.

But Beer is made after this manner; upon the Meal of the Barly, prepared as aboveſaid, boiled water is poured, and is ſuffered to be macerated, or maſhed, for ſome hours, that it may be

ſufficiently impregnated with the active Particles of the germinating Barly, now placed in their vigour: This Liquor being ſatisfied or filled, is drawn off clear from its ſetling, and is laſtly boyled, that it might get a ſomething more thick conſiſtency, and be able to be kept the longer: Then, when it is ſomewhat cold, it is fermented, a ferment, or the flowring of Beer or Yeſt, being put thereto, and ſo tunn'd up in a Barrel. Concerning its Fermentation, theſe things are eſpecially worthy of obſervation.

If it macerate with, or ſtand too long on, the Maulted Meal, the Liquor becomes thick and clammy; and afterwards will hardly ferment or work at all: the reaſon of this is, becauſe the active Principles, in this work, are of a prompt motion, and move together with them, the earthy Particles; with which, if by a long ſtay, the paſſages and pores of the Liquor are filled; being too full, they are wholly obſtructed, and as the contents in the Stomach, ſtuffed to a ſurfeit, ſcarcely ferment at all.

If too hot, or too cold, the Liquor be put into the Barrel; as in the great heat of the Summer, or the cold in the Winter, Fermentation doth not rightly ſucceed: for by too much heat, the Particles are diſſipated one from another, that they cannot, mutually take hold of one another, and ſo work; by too much cold, they are bound up and fixed, that they ſcarce enter into motion, neither perform it ſtrongly.

When the Liquor of the Beer ferments in the Vat, the active Principles do on every ſide explicate themſelves, they precipitate in the bottom the more thick, and Earthy, being partly driven as it were into flight, and partly ſticking to them, they lead them as it were Captive to the top, and there make hollow bubbles continually growing up, and bring them as it were to ſervitude. After a due Fermentation, the whole ſpace of the Liquor is rendered clear and without dregs, in which the Spirits with a little Salt and Sulphur, do abound; in the mean time, in the ſettlement or dregs, a little of Spirit and Sulphur, with a greater plenty of Salt and Earth remains. So long as theſe ſhall be in their places, the Liquor will be clear, ſweet, and Spirituous, but if long kept, or not ſhut up cloſely in a Barrel, great part of the Spirits will fly away: in the mean time, by the defect of theſe, the Saline Particles being exalted, and having gotten a Flux, impregnate the whole Liquor, and make it ſowr; for when Beer, as alſo Wine, goes into Vinegar, it doth not happen becauſe they are wholly deprived of Spirits (for ſo they would degenerate into a taſtleſs thing) but becauſe the Tartarous or Saline parts, are carried forth to a Flux, and infect the Liquor with their ſharpneſs; in the mean time, the Spirits being leſs in power, are depreſſed, that they cannot reſiſt them. Very hot Weather, Thunder, the noiſe of great Guns, or the tunning it in the open Air, ſuddenly makes Beer grow ſowr, for by theſe means the Spirits being diſturbed in their equal motion, are diſſipated; and in the mean time, the Saline or Tartarous parts, being before ſeparated, and depreſſed, are moved, and carried forth into a Flux.

Indeed it plainly appears, that the Spirituous parts in Vinegar, are not wholly deſtroyed, but ſuppreſſed only whilſt the Saline are placed in a Flux; becauſe from Vinegar, may be Diſtilled, a Liquor exceeding hot and burning, like the Spirit of Wine, after this manner: With the diſtilled Vinegar, a Salt is extracted from Minium, or Lead Calcined, of which you have plenty, and ſhall diſtil it in a Retort, the Vinous and burning Spirit is driven into the Receiver; the reaſon of which is, becauſe when the Saline Particles of the Vinegar are united with the Salt of the Lead, the Vinous Spirits yet remaining are then freed; and having obtained their own right, they are urged from their lurking places by the heat of the fire: but thoſe Spirits are not produced from the Lead, becauſe if you give thereto a more vehement fire, the Salt of the Lead, will be melted into a Metal.

But we will return to Beer, from whence we have digreſſed; to which, how great a perfection happens, by Fermentation, appears by this Experiment: If you take Beer new made, not yet purged by Fermentation, and place it to be Diſtilled in a Bladder or Cucurbit, only a vapid or taſtleſs water aſcends, without any Spirits, and ſtrength at all: but if you proceed after the ſame manner with Beer truly fermented, you will have a hot water, and highly Spirituous. And this takes away the objection of ſome, who ſay, that water being even impregnated with the Meal of Mault, ſhould not be any more boiled, leſt the Spirits ſhould exhale; becauſe the Spirits, before Fermentation, are ſo obvolved with the more thick Particles of the reſt, that they cannot break forth from the Concrete.

The more the Beer is impregnated by the Mault, the ſtronger it is, keeps the longer without ſowring; which is helpt if Hops be boiled therein, from which at firſt it grows bitter, but afterwards recovers a grateful ſweetneſs; the reaſon of this is, becauſe the pores of Liquor, which are empty of the Particles of the Meal, when they are poſſeſſed by thoſe of the Hops, the conſiſtency is made more compact, and is more full of fermentative Particles; wherefore there is not quickly given any room for the flux of the Salt. But that the Liquor being at firſt bitter, afterwards grows ſweet, happens for this reaſon; becauſe the Spirituous and Sulphureous parts, ſupplied by the meal of the Mault, come not ſo ſoon to maturity, becauſe of the others mixed with them from the Hops being boiled therein: but when this happens, that they grow to maturity, they eaſily excel all the others, and impart a ſweetneſs to the whole. Not only Hops being

being boiled in Beer, keep it long from ſowring, but alſo many other bitter, or ſharp things, do the ſame: for theſe, foraſmuch as they exceed in a Volatile Salt, hinder the flowings of other Salt; wherefore, ſome are wont to put into the Barrel, a piece of Saſſafraſs Wood, the tops of Wormwood, Broom, the Firr-Tree, the rinds of Oringes, alſo Spices in a ſmall quantity; by which means, the Drink, tho of a ſmaller ſubſtance, is kept a long while from ſowring. Thus much concerning the Preparation of Beer, on the conſideration of which, (as alſo of Bread) we have ſtayed long, becauſe the Word Fermentation is chiefly due to theſe. Let us paſs next to Wines.

Excepting the Blood of Animals, there are no Liquors that grow hot, like Wines; there is found in none a greater plenty of Spirits, Salt, and Sulphur, or a more remarkable turgeſcency, or ſwelling up. The Fermentation of Wines, and the handling of them fermenting, are wont to be taught among the Vintners or Wine-Coopers, as a Secret only to their Apprentices, or the Adepti of their Art. Among them there is delivered a certain Phyſical Science, or Method of Medicine, by which means, the impurities of Wines are purged forth, their heats attempered, or alſo their defect, or ſickneſs may be healed. There are many ways to be uſed, beſides that of Sophiſticating, as a Secret, by which depauperated and taſtleſs Wines are ſold for ſound and rich. But as to our Propoſition, that the Doctrine of Fermentation might be illuſtrated, theſe three things ought chiefly to be conſidered, concerning Wines: Firſt, Their defæcation or cleaning, and their going into parts. Secondly, Their immoderate effervеſcency or growing hot, from what cauſes it is wont to be ſtirred up, and by what means to be ſuppreſſed. Thirdly, The declination of them, when they grow worſe: and by what remedies they are kept that they do not quickly paſs into a taſtleſneſs or Vinegar.

1. As to Firſt, That Fermentation may begin in the Muſt, there is not (as in Beer) required, the putting to any ferment, for the Juice being expreſſed from the Grapes, doth ſo greatly ſwell up with active Particles or Principles, that it preſently of its own accord, grows remarkably hot: but it is a uſual thing in ſome Regions, when the Grapes are trod, to beſprinkle them with Quick Lime, by the provoking of which, as a ferment, the Liquor preſſed forth, grows more fervent, and is ſooner purged. The Muſt or new Wine, is at firſt put into open Tubs, for that they cannot be contained in cloſe Veſſels, for their great heat or working, which ſo boyls up, that water over a fire grows not more hot: when the Wine is a little cooler, it is put into more cloſe Veſſels, in which it is further purged by fermenting. In the purifying, the Spirituous and Subtile Particles greatly ſhake the more thick dregs, and diſmiſs them from themſelves on every ſide, that the Maſs of the Vinous Liquor, being made free from the mixture of the dregs, is rendred clear and without dregs. The Fæces or Lees of the Wine conſiſt of Salt and Sulphur, with a little Spirit and plenty of Earth; which whilſt the Wines grow hot, being ſeparated by degrees, either by Coagulating themſelves mutually, are affixed to the ſides of the Veſſels under the Species of Tartar, or like Lees or Mother, ſettle to the bottom. In the mean time the Liquor ſwimming over them, is very clear and exceeding Spirituous.

Sometimes the defæcation or clearing of Wines is hardly brought about, as a Vinous Liquor is not eaſily freed from the mixture of Tartar: wherefore Vintners are wont to put to the Wines ſome Bodies that either clear them, or precipitate them, ſo as the Earthy matter ſwimming in them, may ſooner ſettle to the bottom: The things which ſo clarifie Wines are of two ſorts: for they have either viſcous parts, as Glew, the Whites of Eggs, and ſuch like, which ſtick cloſe to the fæculencies of the Wine with laying faſt hold on them, and carry them with themſelves towards the bottom: Or elſe they abound in a precipitatory ſtrength, which while they enter into the pores of the Liquor, thruſt forth the more thick Particles from thence, and ſtrike them down to the bottom; as are the duſt of Alabaſter, Calcined Flints, and ſuch like.

2. Wines tho at firſt they were well cleared, yet afterwards they conceive immoderate effervеſcencies, ſo that the Tartar, being ſtirred up from the bottom, it at length mingled with them; alſo the Spirits being looſened, now the Sulphureous Particles, now the Saline being too much carried forth, render the Wines unſavory, clammy or ſowr. We will conſider theſe things, from what Cauſes they come to be ſo, and by what Means they are Cured.

Wines very often contract heats, when they are full of Tartar or too rich Lees: For Tartar or Lees, tho ſeparated from the Liquor of the Wine, and depreſſed to the bottom of the Veſſel, yet for that they conſiſt of plenty of Salt and Sulphur, they ſtill ſend from themſelves fermentative Particles, by the inſpiration of which the Wine is kept in an equal motion of Fermentation: and as the Wines are leaſurely ripened, ſo the Salt and Sulphur which lurk in the Tartar, are by little and little exalted; until at length, being carried forth to a flux, they infect the Vinous Liquor, with a troubled feces or dregs, and compel it to grow immoderately hot, and to boyl up. Againſt theſe too great heats of Wines, there is a neceſſity, that they be preſently drawn off or rack'd, from this too rich Lees, and put into another Veſſel, or elſe it comes to paſs, by reaſon of its too great diſturbance, the Sulphur being very much exalted, that they become unſavory and ropy; or the Spirit being loſt, and the Salt carried forth to a flux, they contract a ſowrneſs, and turn to Vinegar.

Neither doth Wine grow more hot than it ſhould do, only from Tartar, or too rich Lees, but by too great agitation, immoderate heat, or by an extraneous or ſtrange Body put to it, and not miſcible, or that cannot mingle with it: for by theſe and other ways, the Sulphureous part of the Wine grows hot, aud from thence conceives a fervour, and undue boyling up; for the ſetling of which, beſides the racking or drawing it off, from one Veſſel into another, they uſe to pour plenty of Milk, into the Pipe or Barrel, by whoſe mixture the heats and tumults of the Wines are preſently appeaſed; but as by this means the Spirits of the Wine are very much overcome, it cannot keep long, but ſoon after degenerates to Vinegar, or without taſt; therefore the Vintners are neceſſitated to ſell preſently the Wines mended by this Artifice, and very ſuddenly to draw them off.

Theſe kind of heats of Wines, tho' they be timely appeaſed, before they wholly ſpoyl the Wines, yet they leave ſome viciouſneſs, by which the Vinous Liquor is altered from its due colour and conſiſtency, and is made leſs grateful to the Palat: for Wines made hot, oftentimes become of a more deep colour, *viz.* they degenerate from a watery and clear colour, to a Citron or Red, and give to the taſt a rankneſs; all which indeed proceed, from the Sulphur being too much carried forth and exalted: For theſe kind of diſtempers of Wines, they proceed after this manner; for the mending the colour, oftentimes ſimple Milk, or boiled with Glew or fine Flowr, is poured into the Hogſhead or Pipe; for theſe procure a certain ſeparation of the exalted Sulphur, and with its whiteneſs give a clearneſs, or reſtore the colour to a brightneſs. Mucilaginous, clammy, or ropy Wines, are amended by the infuſion of burnt Alum, quick Lime, Gypſum, or Plaiſter of Walls, Salt and the like; for theſe cauſe a new Fermentation, that the more thick Particles are thruſt forth from the reſt, and precipitated towards the bottom. The unſavourineſs is helped by the ſame means.

3. As to the the third Propoſition; Wines are depauperated or made poor, when by a long efferveſcency the Spirit and more pure Sulphur, being exhaled, the Saline Particles begin to be exalted: in this caſe their languiſhing ſtrength is ſuſtained with certain Remedies, as it were Cordials.

As the Spirit and Sulphur being too much carried forth, and exalted, is cured by the drawing off the Wines from the rich Lees; ſo the ſame being depreſſed, the Remedy is, that they be put to a more rich Tartar or Lees: wherefore the Vintners are wont to pour the depauperated Wines, deſtitute of plenty of Spirits and Sulphur, and which begin to grow ſowr, by reaſon of the Salts being carried forth to ſound and freſh Lees or Tartar; that they might, as it were, anew inſpired with Spirit and Sulphur, ferment and recover new ſtrength and vigor; beſides they make Syrups of generous and rich Wines, with Sugar and Spices, which they pour among the ſtale and deadiſh Wines. Further, for Wines turning to Vinegar, they are ſaid to adminiſter profitably, ſome other Remedies. *Gratarolus* praiſes, with many more, Lard and Swines fleſh ſalted, wrapt in Linnen, and put into the Cask: and truly it is probable, that the Sulphureous odour of this doth reſtrain the flux of the ſowring ſalt; for this end the ſame Author commends Leek-ſeed, Pine-nuts, blanched Wheat, boiled Wine, Aſhes, the ſhavings of Willow, and many others; for the ſalt readily acts on theſe kind of ſubjects, and ſpends its force; even as Virgins ſick of the Green-ſickneſs, deſire greedily to eat ſuch like abſurd things, that may ſatisfie the extraneous, and for the moſt part ſowriſh ferment of the Ventricle, but very hurtful to themſelves. There remains another kind of Cure, whereby ſmall Wines almoſt corrupted, and growing vapid or ſmatchleſs, recover new vigor for a time, to wit, a portion of Rheniſh Wine, or others, very fermentable, is laid up, and hindred from fermenting, from whence it is made a perpetual Muſt (commonly called Stum) if a little of this Liquor be poured into a Cask of ſtale Wine, and jogged together, it gives a freſh, and new Fermentation to the whole: ſo that that Wine will froth and boyl, and ſhut in a Glaſs, will leap forth; but the drink mended by this Artifice, is accounted very unwholſom, for that it is apt to ſtir up an immoderate Fermentation in our blood: wherefore it is prohibited by Edict, that the Wine-Coopers or Vintners make not uſe of this kind of Sophiſtication.

It is a uſual thing alſo, to ſtop up cloſe, in Stone or Glaſs Bottles, for a time, ſmall Wines, and new Ale or Beer, which being afterwards opened, the Liquor ferments ſo impetuouſly, that being almoſt all rarified into froth, it flies forth of the Bottles: which beſides contracts ſuch an acrimony or ſharp cutting, that it can ſcarce be ſwallowed: The reaſon of which (as it ſeems) is this: The turgency or ſwelling up, and the notable acetoſity, ſharpneſs, or quickneſs of theſe kind of Liquors, proceeds chiefly from the Salt being exalted, and having gotten a Flux; for when as the Liquor, being full of much Tartar, and little Spirit, is ſhut up cloſe in a Veſſel, all the Particles together are forced to be fermented, and when they cannot be ſeparated, and fly away from one another, they do the more trouble one another, and break themſelves into ſmall bits; that by this means the bond of the mixture may be wholly broken; but the little bodies looſened one from another, and as it were freed by reaſon of the cloſeneſs of the Veſſel, are forced together: wherefore when the Veſſel is opened, all the Particles at once being ready for flight, like Air ſuddenly rarified, break forth with noiſe and tumult: and becauſe

the

the Saline parts having gotten a Flux, by reaſon of the plenty of Tartar, are ſtronger than the Spirit and Sulphur, from thence the notable cutting ſharpneſs is cauſed in the Liquor.

Cyder comes next to the Nature of Wine, to wit, of the ſmaller ſort, which kind of Liquor, is only the Juice preſſed from Apples, and brought to maturity by Fermentation: concerning this kind of Drink, it is worth obſervation, that if it be made of Summer-Fruit, or too much ripened, it will not keep in ſtrength, but preſently degenerates into a deadneſs: but if it be prepared of very unripe, and ſowr Apples, it contracts a bitterneſs, for that the Spirits do not ſufficiently ariſe in this, but give place to the ſalt, having firſt gotten a flux: but in the other, they are not long enough retained, but wholly fly away, before the maſs of the Liquor attains to full Fermentation: but there are Fruits and Apples, exceeding fit for this buſineſs, which being indued with a more firm conſiſtency, are not quickly corrupted, neither do they attain their perfect maturity or ſoftneſs, but of a long time: The Juice of theſe wrung forth, and put into a Cask, does not grow hot, as Beer, with a great frothy head, but after the manner of Wines, with a noiſe, like a Pot boyling over the fire: whilſt fermenting after this manner, it is made clear, the more light Recrements are carried upwards, and remain in the ſuperficies, as the flowering: but the more thick parts and Tartarous ſettle plentifully in the bottom; but the more ſolid Cruſt, or Coagulated Tartar, is not fixed to the ſides of the Veſſel; which is a ſign Cyder is a more wholſom Drink, nor ſo infeſtous to the nervous ſtock, becauſe it abounds leſs with a ſharp ſalt than ſmall Wines. The Liquor ſwimming over theſe Fæces or Lees ſettling in the bottom, enjoys it as it were its food, and is kept by its inſpiration in ſtrength; from which, if it chance to be drawn forth, it quickly grows ſowr: for indeed this kind of Drink, is in great danger to be deſtroyed by the flux, or ſowrneſs of the ſalt: againſt this ill, to preſerve it, ſome are wont to caſt into the Cask Muſtard Seed bruiſed, or Muſtard Balls, for that the Volatile Salt of this hinders the flux of the acetous Salt, ſo that the Liquor thereby preſently grows clear, and keeps the longer: another kind of Remedy againſt the ſowrneſs of Cyder, is, that as ſoon as it begins to grow ſowr, it be drawn off from its Lees, and kept in cloſe ſtopped Bottles, with a little Sugar; for by this means it ferments anew, and becauſe, together with the flux of the ſalt, the ſpirits being carried forth, are detained from flight, a very grateful ſharpneſs is cauſed to the whole Liquor. Alſo, almoſt by the ſame preparation, and the like proceſs of Fermentation, a potable Liquor is made out of Pears, which is however above meaſure ſweet, and if plentifully drunk, renders the Belly looſe, as if they had taken Phyſick.

So much for Fermenting Liquors, whoſe vertue conſiſts in the Spirit being carried forth, and obtaining the height of perfection: there remains other Preparations, whoſe vigor is placed in the ſaline part being exalted, and having gotten a flux; among theſe, Vinegar is of chiefeſt note, the way of making of which, being wholly unlike the aforementioned, requires a method of Fermentation, very different from thoſe before deſcribed: For example, ſmall Wines, or more generous or ſtrong Beer, being put up into the Cask, are expoſed in the Summer-time, for a long while to the Suns Beams, or elſe in the Winter, they are kept near a Stove in ſome hot place; after this manner, whilſt ſome Spirits evaporate, the reſt being put under the yoak, the Saline parts are exalted and infect the whole Maſs of the Liquor with their ſharpneſs: but not only Wines long kept, or ſtale Beer, out of which the ſpirits of their own accord, begin to go away, but freſh Muſt, or new Beer, paſs after this manner into Vinegar; for the Country-women are wont to place without doors all the Summer, ſtrong Ale, and highly impregnated with Mault, in a Cask, by which means they make an exceeding biting and moſt penetrating Vinegar.

Yea after the ſame manner almoſt, our kind of Hydromels, Honied Drink, or Meath are wont to be prepared: to wit, they boyl ſixteen parts of Water with one part of Hony, to the conſumption of a third part, adding then ſome Spices, together with a ſharp ferment, they place the Cask and Liquor for many days in the Sun, and afterwards in a Wine-Cellar. It ſeems the Sunning of it is uſed, that thereby the Saline parts being brought towards a flux, might ſomewhat reſtrain the nauſeous ſweetneſs of the Hony: and by that means the ſweet being tempered with ſharpneſs, a moſt pleaſing taſt is afforded to this Drink.

By reaſon of the ſharpneſs ariſing from the flux of the Salt, alſo very many eatable things are wont to be prepared after various manners; hence the fleſh of living Creatures, and eſpecially of Fiſhes when they ſwell with too much Sulphur, are pickled with ſalt Brine or ſharp Liquors, that the Salt being brought forth, they may become more grateful to the ſtomach. It would be a tedious buſineſs to inſiſt here on particulars; but I will in this place deſcribe a certain noted kind of Oaten Broth, Grewel, or Flumery, which profitably nouriſhes Feveriſh, alſo Conſumptive and Hectick People.

This kind of Drink, that it may become gratefully ſowriſh, the Meal of Oats is put into common water for about three days, till it acquire a ſomewhat ſowr taſt: then, this infuſion is placed upon the fire, and with a Ladle is ſtirred about until it boyls, and when it riſes up ready to flow over the Veſſel, it muſt then be poured forth into a Platter, and preſently cooled; it will

will appear like Gelly, and may be cut into bits; which if heated ſoon melts. In this preparation may be obſerved, that by a long infuſion of the Grain, the ſaline parts being brought forth, do get a flux; then theſe ſo impregnate the Liquor that the more thick Particles being by the heat brought into its pores and paſſages, they are ſo ſtrictly ſhut up, that they cannot eaſily ſink down, but that the whole mixture becomes like Gelly.

It would alſo be too great labour to heap together here, the various Condites and kinds of Pickles, for it would be to deſcribe under that rank the whole Art of Cooking and Diet. For in both the only aim is, that for healths ſake and for pleaſure, the active Particles in our food, may be placed in their vigor and exaltation; for ſo they greatly pleaſe the Palate, and by a more eaſie digeſtion go into nouriſhment: for this reaſon, not only Drinks, and Confections of Corn, and Herbs of a diverſe nature and kind are thought on; but alſo we variouſly prepare fleſh, both boiled and roſted, and add to them ſauces, that the Particles, now the Spiritous, now the Saline, being carried forth to a flux, might pleaſe the taſt, with a certain ſharpneſs. Thoſe which are of a more fixed nature, are brought to exaltation, by Sauces made of Sugar, Salt, or Pepper. They are wont to keep ſome fleſh almoſt to putrefaction, that by that means, the active Particles being placed in their ſtrength and motion, may become of a more grateful taſt. Here might be interwoven, a long diſcourſe concerning Medicinal Compoſitions, but becauſe this ſubject, deſerves a peculiar conſideration, I will ſay nothing more of it here. Let us next ſee by what motion of Fermentation and Habitude of Principles, Natural Bodies tend towards diſſolution; or what is the progreſs of every thing to Putrefaction and Corruption.

CHAP. VIII.

Of the Motion of Fermentation, which is obſerved in the Death, alſo in the Putrefaction and Corruption of Bodies.

NAtural Bodies in which Spirit, Salt, and Sulphur, are found in but a mean quantity, do not ſtay long in the ſame ſtate: for theſe active Principles are employed perpetually in motion: As ſoon as they come together, they tend from Crudity and Confuſion towards Perfection, for the ſake of which, when they have reach'd the height, they are able to come to, they are not quiet in this point; but from thence they make haſt towards the diſſolution of that thing. Thoſe which are more volatile do firſt of all break forth from the looſened bond of the mixture; then the reſt ſeparate into parts, until the form of the mixture wholly periſhes: The Spirit being carried forth to the top, flies away firſt with the water, and the more pure Sulphur, and by its expiration, diffuſes a very grateful odour; afterwards the more thick Sulphur, with the Salt, being looſened from the band wherewith they were tyed, and having gotten a flux, by degrees evaporate, and together diſperſe a very ſtinking ſmell: together with theſe, the watery parts flow forth, and the frame of the ſubject breaks, or falls down into Earth, or a *Caput Mortuum.*

This kind of proceſs may be obſerved both in natural things, and alſo in Subjects prepared by Art: Concerning Natural things, the disjunction of the Elements, and their ſeparation into parts, may be ſeen both in the death of living Bodies, or the extinction of life and vegetation; and alſo in the corruption of them being dead, and in their reduction to a rottenneſs.

As in Vegetables, the growth and maturity depend on the combination and mutual cleaving together of the Principles, ſo the decay and death depend on their going aſunder, and ſeparation, in Plants and Fruits; being by degrees exalted from a crude and ſowr Juice by Spirit and Sulphur, they come to maturity; to which a ſweet taſt and ſmell, and a pleaſant colour happen: then preſently the ſame matter, the Spirit and Sulphur, and the reſt of the Elements leiſurely flying away from the ſubject, is ſoon reduced to a filthineſs and rottenneſs: If after the ſubtil and more pure Particles of Spirits and Sulphur are flown away, there ſtill remain plenty of Earth and Salt, with ſome Sulphur, the matter does not putrifie, but grows dry with an hoarineſs: but if the thick Salt and Sulphur, having gotten a flux, break forth from the Subject, together with the reſt, the bond of the mixture being looſened, preſently the external humidity, poſſeſſes the ſpaces left by theſe, and the Body is reſolved into rottenneſs.

Alſo all Animals whatſoever, have ſet bounds of their growth and duration: For they aſcend from their beginning, by ſlow increaſe, to motion and ſenſation; then to the ſtrength and exaltation of Nature: in which point they ſtay not, but from thence, by equal ſteps, make haſt towards their fall.

If

If the cauſe of this kind of limitation be required, we ſay that Mother Nature hath placed in the primigenious ſeed of every thing, ſuch a ſtock of Spirit, Salt and Sulphur, which might ſuffice for the producing the utmoſt thrids or lineaments of Bodies: ſo that the growth and aſcent of the thing, to its height or *achme* is only an evolution, or unrowling of that radical matter, and protenſion or ſtretching it ſelf forth into a greater dimenſion; in the mean time the little ſpaces and vacuities, which are made by the protraction of this matter, are filled up by the active Particles, ſupplied by Nutrition, which alſo by a continual ſeries of motion are ripened, exhaled, and give place to others ſucceeding. As ſoon as this ſeminal matter is unfolded and exalted to the height, that it cannot be moved, or expanded further, the matter is then brought to the ſtate of its perfection: from thence ſome Particles of this Radical ſubſtance, together with the ſecondary ſupplied from the Nouriſhment, begin to evaporate; and others daily, and then others, being after this manner conſumed, both the ſolid parts, by degrees decreaſe in their ſubſtance, as alſo the Nutritious Juice and Blood, even decline for the worſe, till by a long waſting, the props of the Body, are made dry or withered, and the Blood ſo depauperated, that it will not ſuffice for ſuſtenance to the vital fire: juſt as it may be perceived in a Lamp, if the Oyl being continually conſumed, in its place be put Water, the Liquor is rendered poor, and diluted, that it is not able any longer, to cheriſh at all the flame of the Wick.

When the Life of Animals periſhes, (either it expires after the aforeſaid manner leiſurely, and like a Candle or Lamp is extinguiſhed, the Oyl or Tallow being conſumed; or it is choaked by a haſty death, being ſnatched away by Fate, or the violence of a Diſeaſe) preſently the Spirits, with Salt and Sulphur, flowing together in the blood; and alſo planted in every part, ceaſe from their regular motion, and are moved into confuſion: then they partly exhale from the pores, with the vaniſhing heat, and partly being ſhut up within in the Cavities, inordinately ferment, with the remaining Particles, and make a ſwelling up of the inwards, and of the whole Body. But afterwards the frame of the ſolid parts being by degrees looſened, and the Sulphureous Particles, together with the Saline, having gotten a Flux, begin to evaporate; from thence a ſtrong ſtink and corruption ariſe. The active Principles, breaking forth by heaps, do often mutually take hold of one another, and being combined in the ſuperficies of the Carcaſe, produce Worms: at length when they are wholly exhaled from the Subject, what remains falls into duſt.

It is a uſual thing for Worms to be generated in Vinegar when it is corrupted and loſt its ſtrength, which being exceeding ſmall; and ſomewhat long and ſmooth like Eels ſwim in the Liquor, and may by the help of Glaſs be expoſed to our Eyes; theſe being ſeen, it is commonly ſaid, that the ſharpneſs and pricking of the Vinegar proceeds from theſe little Creatures, which is a vain thought that deſerves not a refutation; for they are only to be found in dead Vinegar; and I pray from whence have they their teeth ſufficient for the gnawing of Iron? But the whole corroſive force of Vinegar is more truly referred to the Salt having gotten a Flux: in the mean time thoſe little Creatures ſeem to be begotten by this means; it is ſufficiently known, that when very many Subjects are brought to putrefaction, the active Principles being thruſt out of doors, yet ſtill affecting their old dwelling, remain ſomewhere about the neighbourhood, and being joyned together, do often produce living Bodies; wherefore, when moiſt things putrifie, moſt often little Worms grow on their Superficies; but in Vinegar the buſineſs is a little different, to wit, becauſe the Elementary Particles are more fixed, therefore when the mixture of the Liquor is wholly diſſolved, the active Principles, although looſened, yet breaking very hardly and difficultly from the ſubſtance, meet together in the bowels of the Subject, and there mutually cheriſhing one another, cauſe thoſe little Creatures in the midſt of the waters.

Alſo the Bodies of living Creatures, being prepared for our Food, are diſpoſed towards putrefaction, if they are put up for ſome days, till the active Particles are looſened, and begin to be in motion, tending to exhalation; wherefore both the Fleſh becomes more flaccid, and in eating more tender and ſoft: and if they are kept longer, till the Saline and Sulphureous parts being carried forth into a Flux, do break out, preſently a ſtinking ſmell and putrefaction is induced.

There are many ways whereby fleſh is wont to be kept from putrefaction; the chief of which are, that it be pickled with Salt or Spices. Things are kept a long time incorrupt and very grateful to the taſt, with Salt: Dead Carkaſes are imbued with Spices, that they may remain a long while in their Sepulchers. As to the firſt, Brine or ſalt Pickle hinders the eruption of the Sulphur, and fixes it in the Subject by its embracement, and retains it. Spices, as they conſiſt of very active Principles, ſtir up a new Ferment in the Subject, the dead Carcaſe; and the implanted Elements of this, joyn into the ſociety of their motion, and retain many of their Particles flying away, yet longer in the Body: As Salt and Spices are made uſe of for the preſerving long fleſh, and Sulphureous things, (which alſo preſerve all other things from Putrefaction) ſo Vegetables, and their Flowers and Fruits are better conſerved with Sugar: for this by cheriſhing the active Particles of the Subject, reſtrains them within, and beſides, renders the Confections of a very grateful taſt.

Minerals,

Minerals, chiefly the ſolid and hard, becauſe they are indued with plenty of Salt and Earth, with little of Sulphur, and with a leſs quantity of Spirits, therefore they rarely, or not at all conceive Putrefaction: there is the ſame reaſon for reſinous things, which tho' they abound in Sulphur, with Salt and Earth, yet becauſe there is but a ſmall portion of Water and Spirits, therefore their frame is not eaſily looſened, neither are they obnoxious to Putrefaction. Among Minerals, common Water only, falls under this rank: for this, if it ſtand ſtill, or is kept long in a Veſſel, its Salt and Sulphur, though but in a little quantity, having gotten a Flux, begin to evaporate, and together to induce Putrefaction: but ſo long as water is in motion, theſe Particles are ſtill involved with others, and ſo by their mutual embrace, are detained from evaporation.

Artificial things and preparations, are no leſs ſubject to Putrefaction than Natural things; for Bread, and all manner of Eatable things or Food, Wine, Beer, and other Drinkable Liquors, alſo Medicinal Confections, being long kept, firſt loſe their ſtrength and vigor, and then afterwards are Corrupted: concerning which, we may obſerve theſe following things.

The more the things are Compounded, and have all the Principles conjoyned together, the ſooner, and the eaſier, do they enter into Putrefaction; wherefore Eatable things, prepared of Fleſh, Broths, Decoctions of Herbs, alſo many Medicines made after the Galenical way, are wont (unleſs preſerved with very much Salt or Sugar) to be Corrupted in a ſhort time: In the mean time, Diſtillations, and Chymical Preparations, which conſiſt of Homogeneous, or not much different Particles, are kept ſound a long while.

In Compounded things, if there be too great quantity of Water, things ſooner putrifie, for ſo the frame of the mixture is too looſe; ſo that the fixed Principles cannot take hold of the Volatile, or keep them back from flight: but thoſe in which Spirits abound with moderate Salt and Sulphur, if they are kept in a cloſe Veſſel, that they may evaporate but little, continue a long time, as may be perceived by ſtrong or generous Wine. The next to theſe, are thoſe things which are preſerved with Hony or Sugar, or in which the Saline Particles are in great plenty by nature.

Many of theſe, whilſt they are corrupted, are either made Mouldy or Rank, or they grow ſowr, or degenerate into a vapidneſs, or without taſte: things are made Mouldy, when the ſubtil Particles in the exhaling, are detained by the more thick, and cleaving together by their mutual embrace on the ſuperficies of the Body, grow into a ſoft Down or Hoarineſs, even as Moſs is brought forth by Stones, or Wood expoſed to moiſture.

Rankneſs or unſavory Taſte, happens chiefly in Sulphureous things, for Oily and Fat things, by Heat or Age, become Muſty or Unſavory, to wit, when the Spirit being very much exhaled, the Sulphureous Particles are too much exalted, and begin to evaporate.

Sharpneſs or Acidity is induced from the Salt, being too much carried forth and looſened; for when the Spirit is depreſſed, or exhaled, the Salt being fuſed, conceives a Flux, and ſo brings in a ſowrneſs: hence Wine, Beer, Cyder, alſo Milk, very many Eatable things, and the Juices of Herbs, when they are long kept, or if they are moved by too immoderate heat of the Air, or ſhaking, do eaſily grow ſowr.

Liquid things, degenerate into a vapidneſs or taſtleſneſs, when the active Principles, are for the moſt part gone forth, and nothing eminent beſides Water and Earth, or of the ſubtile parts, is left in the ſubject.

That I may contract what is aforeſaid; the corruption of every thing, is only the ſeparation and departure of themſelves from one another into parts of the Principles before combined, (the bond of the mixture being looſened) which motion, by reaſon of the diverſe diſpoſition of their breaking forth, (either with or without a ſtink) ends in Putrefaction or Rottenneſs.

Where Spirits abound, and that there is alſo plenty of Sulphur and Salt, and the Particles being looſened from their bonds, break forth in heaps; the mixture putrefies with a ſtink; alſo if it conſiſt of a thick ſubſtance, ſo that all the parts are not rightly ventilated, it conceives a heat from the Putrefaction: in ſuch a Corruption, the ſtink proceeds from the exhalation of the ſharp pointed Sulphur, or made pricking with the Salt: Putrefaction follows, for that the external humidity enters into the place of the Particles flying away: But the heat is produced by the Sulphureous Particles being moved together in heaps, and being ſhut up within the ſubject, that they gather together, and being united, act more ſtrongly. But if there be in the ſubject a leſſer proportion of Salt and Sulphur, ſo that when the mixture is looſened, the Particles are moved more ſlowly, and evaporate leiſurely, the Body grows dry, and is reduced to a waſting, without any ill ſmell, putrefaction or heat.

It will not be from the purpoſe to inquire in this place, from whence ſome empty Veſſels, and more moiſt bodies, by lying long, conceive a certain ſtink without Putrefaction; alſo other things being put into them, or lying near them, are wont to partake of their Evil; for which affection, a proper Latin word is not eaſily to be met with; in our Idiom it is called Muſtineſs, and in ſome ſort ſeems to be deſigned by the word *Mucor*, unleſs that *Μύκης* or *Mucor*, points at Bodies

Bodies infected with a certain Down or Hoarineſs, (which we call Mouldineſs) which here never happens. The conſideration of this matter is not improperly referred to the Doctrine of Fermentation, for this Tincture or Impreſſion of a ſtink, unfolds it ſelf far abroad, as if it were a certain Ferment, that the Veſſel but lightly imbued with it, infects whatever Liquors are put into it, and infuſions of them, even new and often iterated; we may obſerve a twofold effect of this thing: For ſometimes the Veſſels being almoſt empty, at firſt vitiated, afterwards infect moſt Liquors, which they by chance receive, with a muſty odour: ſometimes more moiſt compacted, and ſolid things, being kept long, ſomewhat cloſe in a Cellar, contract this vice of their own accord; when in the mean time the contagion is not perceived to be in the place where they were kept; which things either may become muſty, not becauſe they are corrupted, for in moſt Spirit, Salt, and Sulphur, being yet contained, in the bond of mixture, the frame of the matter is kept whole, but the vice only conſiſts in this, that from the ſubjects after this manner diſpoſed, *effluvia's*, as it were, aculeated or ſharpned, fall off, and therefore become ungrateful to our ſmell and taſte.

Firſt, that any Veſſel may conceive a muſtineſs, there ſeems to be required in the firſt place, that its inward hollowneſs be large, and its mouth narrow; to wit, whereby a paſſage may lie open to the outward Air, and reſt may be granted to it, being entred in: for Juggs with broad mouths, alſo Bottles cloſe ſhut, do not eaſily get this fault. Secondly, that beſides the more ample inward hollowneſs, the ſides of the Veſſel be indued with pores, and very ſmall paſſages; for in theſe kind of little ſpaces beſmeared with humour, the Air being ſtrictly ſhut up, remains more quiet, and is apt to ſtagnate: Wherefore Glaſs Bottles are not ſo apt to ſuffer this evil, as Wooden, or Stone Bottles. Thirdly, that ſome moiſture, tho' very little, ſtick about the ſides of the Veſſel, or in its bottom, whereby the Air being entred may be intangled: for if the Bottles be hung up, with their mouth downwards, that all moiſture may drain out, they will never be muſty.

In the ſecond place: when Bodies, without any contagion of a Veſſel, contract a muſtineſs or mouldineſs of their own accord, we may obſerve, firſt, that they are of that kind, which conſiſt of Heterogeneous Particles, that is, a mixture of all the Elements together; becauſe the parts of Vegetables and Animals, and preparations of them, eaſily receive this evil; Minerals for the moſt part remain free from it: Secondly, that there be plenty of humidity in the concrete, for the more dry continue a long while without any hurt: Thirdly, that the Bodies be either kept in a heap unmoved for a long time, or elſe in ſome cloſe Cupbord, or Cellar, without Air; for ſo Wheat or Grain, in a heap, unleſs it be often moved, as alſo all Eatable things, being put up in a cloſe place, quickly grow muſty.

According to theſe poſitions we conjecture, that muſtineſs is made an affection to a moiſt inanimate Body, from the ambient Air, being admitted within its pores, and being got in, there ſtagnating, whereby the Elementary Particles of that mixture, being combined together with thoſe ſent in by the Air, are exalted into the Nature of a Ferment; that they diffuſe themſelves on every ſide with wonderful activity, and their *effluvia's*, as it were ſharpned, ungratefully ſtrike againſt the ſenſories of the taſte and ſmell. When therefore, ſome Subject becomes primarily muſty, a certain portion of the Air placed near, and hindred from ventilation, enters into its pores and paſſages, and there being intangled with a tenacious matter, is wholly ſhut up within the ſubſtance of that Concrete. From the mixture of the ſhut-up Air, the implanted little Bodies of the matter, eſpecially the ſulphureous and ſaline, acquire new heads; that afterwards, when they are exactly to be mixed with no other Body, yet very greatly Fermentative, tho' intermingled with any other thing, retain their own Nature, and being diffuſed through the large ſubſtance of the matter, infect the whole; to wit, they diſpoſe by that means, the Particles of that new matter, that they being armed with ſharp points, bring in like manner a trouble to our ſenſes: But in the mean time, from the muſtineſs, whether primarily ariſen, or received by contagion, the mixture of the thing is not diſſolved, nor the Principles diſſipated; yea, thoſe things which are wholly taſtleſs, do ſcarce at any time become muſty: the muſty ſmell depends chiefly on the active Principles, diſpoſed by a peculiar right, by the involved Air and their *effluvia's*; wherefore, if they almoſt wholly fly away from any ſubject, that is rendred almoſt incapable of this affection.

There may be obſerved a certain likeneſs between muſtineſs and an Empyreuma, or taſte of fire or burnt-too, for as in this, the Particles of the fire being intangled, and included by a tenacious matter, by their long ſtay there, pervert the implanted little Bodies of Salt and Sulphur, from whence their *effluvia's*, ſtrike our ſenſes with an ingrateful ſharpneſs; moreover, being mingled with other things, they affix to them, the diſpoſition of their pravity; ſo in muſtineſs, the Particles of the Air, being obvolved with a viſcous matter, and ſtagnating, they change by their preſence the ſaline and ſulphureous little Bodies, from their due temper, whereby they being as it were gifted with ſharp prickings, do ſtrike bitterly our ſenſories, and being exceeding fermentative, diffuſe their odour to others: the alteration being either way contracted, can ſcarce be blotted out, by any mixture with other things, or emendation by Art: The

chief means of helping of either, is by placing it in a reciprocal trajection, *viz.* Empyreumatical things, or tasting of the fire, are to be a long while exposed to a more moist Air, whereby the Particles of the fire may exhale: and musty things are to be held to the fire, or put to such things which may sweeten their Nature, to wit, quick Lime, Sulphur, or Stygian Waters, by which the parts of the included Air are driven away, and so the remaining little Bodies of the mixture are wont to recover their pristine state; wherefore, if musty Liquors are distilled, the Water falling into the Receiver, will be deprived of that stink: But the smatch of Fire, or Empyreuma, is not so easily mended by this Artifice.

So much for Fermentation, and the motion of the Principles, for as much as within the Confines of the same Subject, they dispose it, either to maturity and perfection, or towards dissolution and corruption. It now follows to treat of the motion of the same kind of Particles and Principles, for as much as some of one Body do act on others of another Body, and by dissolving the mixture, do wholly draw them forth, and send them outward, or by precipitating it causeth them to go into parts.

CHAP. IX.

Of the Motion of Fermentation, as much as is to be observed in the Dissolution of Bodies.

FOR the Solution of Bodies, there are two great solvencies, or Menstrua, which exist from Nature; to wit, Water and Fire: Fire, if it be next and immediately applied, destroys most Bodies, drives away the Principles one from another, and as it were dissipates them into Air, Earth only, with a little Salt, being left behind; if it be mediately applied, it brings away some Particles, so that in the mean time others remain: After which manner it serves chiefly for Distillations, and Chymical Operations, and is also used in the Preparation of necessaries for our Food, both about the Boiling and Rosting of Meats. Water does not so readily destroy Bodies, but it draws forth some parts from the Subjects, and receives them into its own Bosom, and firmly retains them for various uses: But as it does not easily penetrate every Body, but leaves almost untouched those which are of a more fixed Nature, various ways are thought of, whereby the Menstruum of Water is made sharper, and is rendred fit for the dissolving of any Bodies whatsoever. For by means of the Bodies, which it ought to dissolve, and of the parts which it ought to receive in it self, it is armed as it were with some Weapons; with which it is able to unlock any Subject, and to possess now these, now those Particles. The Menstruum of Water is sharpned with Spirit, Salt, or Sulphur: to wit, either with each of these, or with more of them joyned together; we will first speak of the watery Menstruum, with the various sharpning of it, and afterwards of the fiery dissolvent.

Common Water most easily dissolves the more simple Bodies, except Sulphur; and hides their Particles, in its pores and passages; it readily receives Salts of every kind, and easily imbibes Spirits; it loosens the frame of Earth, and cherishes its more tender little bodies, in its embrace; but it is hardly mixed with Fat, and Oily things, and receives not their Particles, but by the coming between of others, but drives them forth to its superficies, as not miscible, or thrusts them down to the bottom.

Water in some measure enters the more compounded Bodies, whose frame is somewhat loose; and then receives into its bosom, some not simple Particles, but resembling the nature of the whole mixture: hence most Vegetables, also parts of living Creatures, and some Minerals, being put into common Water, do impregnate it with a certain vertue; and from most Metals, by a long maceration, it takes away some strength, though but small. Some Bodies are dissolved by Water, which yet a sulphureous or spirituous Menstrua leave almost untouch'd; as the Gums *Tragacanth*, *Arabic*, &c. also Salts and Sugar.

The first and most common way of sharpning, whereby simple Water may more easily enter the Bodies to be dissolved, is, that it be furnished with fiery Particles, or darts of adventitious heat; for so it is driven more deeply with a certain force, into Bodies, and destroys some thrids, as it were the smallest mites, in their most inward recesses. Wherefore we are wont to boil for a long while, the matter to be dissolved in water, or at least to infuse it in warm water, by which means, the more tenuious, and certain subtil Particles, which resemble the nature of the subject, are easily drawn forth, and impregnate the water, with the vertue of the whole mixture.

So much for the simple, or natural *Menstruum* of Water, to wit, for as much as its activity is wont sometimes to be promoted, by fire or ascititious heat. But this cannot be so simple, but

that

that it contains in it ſelf ſome Particles of another kind; as may be gathered from its eaſie Putrefaction; for oftentimes it is impregnated with ſpirituous, ſulphureous, or ſaline Breathings, contracted from the Air or Earth; that for the drawing forth the Tinctures of very many things, ſometimes it excels an Artificial *Menſtruum*; for that Acidulous or Spawiſh Waters, Mineral Waters, Rain Water, and *May* Dew, are of frequent uſe among Chymicks, for the remarkable faculty of diſſolving, with which they are ſtrong. Beſides, 'tis a vulgar obſervation, that ſome Waters moſt eaſily diſſolve Sope, and being throughly mixed with the ſame, cauſes in the liquor a great ſpume or froth; ſuch, if they be rubbed between the fingers, feel ſoft and gentle; but other Waters, which being handled with the hands, are more harſh, refuſe the mixture both of Sope and Oyl, and ſo are accounted unprofitable for the waſhing of Cloaths: theſe ſort of Waters, if they ſhould be evaporated in a Glaſs, oftentimes affix a Cruſt to its bottom and ſides; becauſe they are impregnated, more than they ought, with ſaline Particles, with which, when the ſaline parts reſiding in the Sope combine, the ſulphureous are carried away, and they being excluded, the pores are thruſt forth as not miſcible, to the top of the Liquor. When Fleſh is boiled in theſe Waters, it grows very red; which Tincture indeed being thence contracted, is a ſign, that thoſe Waters are ſomewhat imbued with Vitriol, or ſome other kind of Salt. But we will paſs to Artificial *Menſtrua's*, in which the watry Liquor is furniſhed with Spirit, Salt, or Sulphur, being gathered apart, or many of them together.

The ſpirituous *Menſtruum* of Water is made, when from a Body ſwelling with Spirits, a clear and limpid Water is diſtilled; as from Wine, or ſtrong Beer, or other Bodies truly fermented, and brought to exaltation: The kind of diſſolvent is hardly to be had ſo ſincere, but it is mixed with the Particles of more pure Sulphur, and ſometimes of a volatile Salt. The former kind of Liquor is called Spirit of Wine, which being ſubtil, and very penetrating, eaſily enters the Bodies, and parts of Vegetables, and alſo of living Creatures, but hardly Minerals, or not at all: it extracts from many things, not any Particles, or reſembling the Nature of the whole mixture, (as common Water) but chiefly Spirituous, and Sulphureous, the reſt being almoſt untouched; wherefore, it is wont to be uſed for the reſinous *magiſteria* of Vegetables, (which it draws forth almoſt ſincere or without mixture, under the form of Gum or Roſin) in the mean time, it is not ſo fit as common Water, for the extracts of Plants, which are not ſo indued with Sulphur: from ſulphureous things, as Benzoin, Sulphur, Olibanum, Styrax, Amber, and the like, it draws forth excellent Tinctures: It diſſolves the fixed Salts of Herbs, alſo of Pearls and Coral, before prepared with Vinegar, by a long digeſtion, and receives their Tinctures into it ſelf: it leaves Sugar, and Gums, being diſſolvable in Water, almoſt untouch'd. But there is another ſpirituous *Menſtruum*, that is ſharpned with a volatile Salt, ſuch is the Liquor which is diſtilled out of Blood, Harts-horn or Soot; it is far ſtronger than the former, and cuts moſt Bodies, except Metals, into parts, and oftimes deſtroys the forms of the whole mixture: yea, it moſt excellently diſſolves ſecondarily, the moſt fixed Metal, to wit, Gold, being firſt reduced into a Calx, by its proper *Menſtruum*, and reduces it into a Tincture, or potable Liquor.

They are accounted Sulphureous *Menſtrua*, which are brought forth of Sulphureous Bodies, under the form of an Oyl: theſe are prepared, either by diſtillation, ſuch as are chiefly the Oyl of Turpentine, Juniper, and the like; or by expreſſion, ſuch as are wrung forth of Olives, Almonds, and other Fruits, or Seeds of Vegetables. Things diſtilled are of more efficacy, than preparations by expreſſion; either of them draw forth ſome Particles, from Vegetables, or Animals; by the vertues of which, theſe Oyls being impregnated, they are made fit for Medicinal uſe. Yea they are conveniently enough made uſe of, for the extracting of the Sulphureous Particles of Minerals, which ſometimes they draw forth ſincere or unmixt: But if Oyl of Turpentine, or Lin-ſeed Oyl, draws forth by diſſolving, the combuſtible part of common Sulphur, in the mean time, the remaining ſaline parts, and untouched by the *Menſtruum*, grow into Cryſtals; as is obvious to every one, in the preparing the Balſam of Sulphur.

Mineral Bodies, in which the bond of Concretion chiefly depends upon Sulphur, as are the Fire-ſtone, Antimony, common Brimſtone, and the like, are in ſome ſort diſſolved by a ſulphureous *Menſtruum*, which draws forth of the Body, Particles of the ſame kind, the ſaline being being almoſt untouched: wherefore Oyl of Turpentine, Lin-ſeed, *&c.* draw forth a Tincture from theſe; in the mean time, ſaline *Menſtrua*, ſuch as are diſtilled Vinegar, or Stygian Waters, profit little for the diſſolving their Bodies: but that theſe, unleſs before Calcined, hardly are touched. But on the contrary, where the frame of the mixture conſiſts of a ſaline bond, ſuch as are Iron, Copper, and the like, ſaline *Menſtrua*, as *Aqua Fortis*, Spirit of Vitriol, Salt, *&c.* receive in the diſſolving, the Particles of the ſame Nature into themſelves, the ſulphureous being almoſt untouched. This plainly appears, in the ſolutions of Metals, but chiefly and remarkably in Camphire, which Stygian Waters reduce into a Liquor, in form of an Oyl, ſwimming on the *Menſtruum*; to wit, they diſſolve its frame, and receive ſome ſaline parts, on which the Concretion depends, into themſelves; in the mean time the ſulphureous being untouched, they are gathered together apart, on the ſuperficies of the Liquor. There is ſomething to be wondered

at concerning Antimony: to wit, that its Concretion being very irregular, that Mineral becomes exceeding unlike, not only to other mixtures, but also to it self; for it is very lax, nevertheless much compacted; it lies open to the least injuries, yet is almost impervious to the greatest, so that it may equally number its losses, with its Victories: some of its Particles lie so loose, that they are brought away by any Oily *Menstruum*, or by a common *Lixvium*, or Lie: others in the mean while do so pertinaciously stick together, that *Aqua Fortis* cannot touch them, only *Aqua Regia* being poured upon it can know it; which so strongly resists it, that the fume raised up from thence, presently obscures the whole Room, wherefore there seem to be in this, parts wholly of a different Nature, some imperfectly mixt, *viz.* Earthy and Sulphureous, which are easily loosned by a fit solvent; in the mean time others wholly Metallic, perfectly mixt, coming near in some sort to the Nature of Gold it self; which therefore are only to be dissolved, by a fit *Menstruum* of Salt.

The saline *Menstrua* are of divers kinds and natures, *viz.* of Vegetables, Animals, or Minerals. Among Vegetables are eminent, the sowr Juices of Fruits and Herbs, Counterfeit Vinegars, acid Liquors distilled out of ponderous Woods, as Guaiacum, the Oak, and Box; in all which, the saline Particles having gotten a Flux, either by Art, or by Nature, give a notable sowrness: or the Vegetable *Menstruum* consists of Salts of Tartar, or made by the cineration of Herbs, and dissolved, which by the Fire are very much whetted, and acquire an acritude; in these the saline Particles are fixed, and in a condition opposite to a Flux. To the rank of Animals I refer the Spirit of Urine, Harts-Horn, *&c.* which although they are impregnated with Spirits, yet they take their chief forces from a Volatile Salt. But the strongest saline *Menstrua*, are drawn forth of Minerals, such are acetous Liquors, which are most strongly forced by fire, out of the Salts of Nitre, Sea Salt, Alumn, Chalcarth or Vitriol, and such like.

Those which are drawn out of Vegetables, as Vinegars, and acid Liquors, do best of all dissolve Corals, Pearls, Shells, and Shelly substances: because in these there is great plenty of Alcalizat Salt, with which the fluid Salt, which abounds in those kind of acetous *Menstrua's*, desires to be most strictly united; wherefore they being applied to the body to be dissolved, enter its pores and passages, loosen the Complications of the Particles of the Alcalizat Salt, and snatch them into their own Embrace. Even after the same manner, the fluid Salt in a Vegetable *Menstruum*, approaches the Volatile Salt in the Horns of Animals.

These kind of *Menstrua's* do corrode some Metals towards the superficies; but do not so potently unlock their bodies by dissolving, as Stygian Waters, some sulphureous subjects, being before loosened by Calcination, do enter aptly enough, and from thence carry forth saline Particles. Wherefore, for the Salt of Tinn, Lead, Antimony, Soot, and others, being first reduced into a *Calx*, we use distilled Vinegar.

The Salts of Tartar, and the fixed Salts of Herbs, although they serve for præcipitation, rather than dissolution, yet because they consist of sharp, and very penetrating Particles, they are of egregious use: For watry *Menstrua's* are chiefly sharpned with these, for the extracting of the Tinctures of Vegetables. And altho' Bodies which abound with an alcalizat Salt, as Pearls, Corals, *&c.* are left wholly untouched by reason of the Homogeneity or agreeableness of the parts in either; and that also, they but little gnaw, only on the superficies, being put upon Metals, and grow together with their Salt, and Sulphur, into rust; yet sulphureous Bodies they readily enter, so they be loosened by the fire, and unlock and pull asunder their joyntings or complexions; wherefore, for the making of the Milk, or *Magisterium* of Sulphur, the Salt of Tartar most excellently conduces.

Saline *Menstrua's* are most strong, which are forced by distillation out of Minerals; to wit, out of Vitriol, Nitre, Sea Salt, Alumn, Arsenick; Acetous Liquors are distilled either from these single, or from many of them mixed together; which as they are of the highest sharpness, like to fire, readily enter most bodies, but chiefly Metalic bodies, and such as consist of a saline bond, and dissolve them easily into most small parts. These Liquors are only saline Particles, which being driven by the force of heat, from the embrace of their Earth, having gotten by that means a Flux, are converted into water: as actual fire chiefly assaults sulphureous bodies, and by destroying the body, draws to it self the consimilary parts; Stygian Waters (which are also called potential fire) easily pull asunder bodies, which very much abound with Salt, as Metals; and break them, inviolable by fire, into most minute parts.

Concerning the Solutions of Minerals, we may observe, that their frame is not easily destroyed, or loosened into parts, as other Concretes of Nature; but for this, most strong *Menstrua's*, and those chiefly Acetous, distilled from Salts, are required; the reason of which is, for that the Concretion of Minerals, depends mostly upon great plenty of Salt, binding the rest of the Particles, as with a bond; wherefore their substance is more solid, more hard, and compact, and only gives place to a saline *Menstruum*. When any Mineral, or Metal is dissolved, the fluid Particles of the Salt, in the *Menstruum*, most easily enter the most strict Complications of the fixed Salt in the mixture, and impervious to any other solvent, loosen them from their binding, and snatch them into their Embraces: after this manner, the Particles of the Salts being united,

and

and dilated by the Liquor, are hidden in the pores and paſſages of the *Menſtruum*; and together with theſe, ſtick, and are alſo ſupped up, by the *Menſtruum*, the more pure and minutely divided bodies of Earth or Sulphur, which were in the mixture; in the mean time, the more thick, and more ſtuffed with Earthineſs, are præcipitated to the bottom of the diſſolving Liquor: wherefore Gold and Silver are wholly devoured by the *Menſtruum*; but Iron, Lead, *&c.* and alſo Metallic Recrements, ſend forth from themſelves, in the diſſolving, Heterogeneous Particles, as ſo many off-ſcourings: when Minerals are broke into parts by this means, the divided Particles, and moſt minutely broken, (ſo long as they equally cohære with the Particles of the fluid Salt, which are in the *Menſtruum*) being diſperſed through the Liquor of the *Menſtruum*, and hidden in its pores and paſſages, are ſupped up, and rendred inviſible. Yea alſo, the humor of the *Menſtruum* being taken away, the remaining *Calx*, which conſiſts of the Particles of a mixt, and fluid Salt, combined together, is diſſolved in any other Liquor: but if after a Metallic ſolution, the fluid Salt be drawn off, from the Particles of the thing ſoluted, or by Calcination, it neither poyſes any Liquor it is put to, with a new adjection of fixed Salt, nor do the little bodies of the thing ſoluted fall through the pores of the *Menſtruum*, nor are they laſtly ſupped up, by any Liquor added to them.

But that among Metals, ſome are corroded by any acetous Liquor; in the mean time others, as Silver and Gold, require a peculiar ſolvent, as it were to be unlocked by an appropriat Key: and what is more wonderful, common *Aqua Fortis*, which eats Silver, leaves Gold altogether untouch'd: then the ſame Liquor by an addition of *Sal Armoniac*, is made a proper diſſolvent of Gold, and has no power upon Silver: The reaſon of thoſe may be thus underſtood: Gold and Silver are more compact Metals, very much cleanſed from earthy matter; wherefore they are not broken into parts by any ſolvent, but only by thoſe kind of *Menſtrua's*, which conſiſt of a Salt homogeneous or agreeable with them. But as the frame or ſubſtance of Silver depends upon a Vitriolic Salt, and that of Gold, on an Armoniac Salt (or of a more perfect kind; to wit, ſuch as is wont to be moſt ſtrictly complicated with Sulphur) hence *Aqua Fortis*, ſo long as it is ſtrong with a Vitriolic vertue, combines with the Salt of the Silver, and therefore unlocks its frame or ſubſtance, but doth not looſen the concretion of Gold, which depends upon an Heterogeneous bond: If that to this *Menſtruum*, *Sal Armoniac* be added, the power of the Vitriolic Salt is blotted forth, and the ſaline darts of the ſolvent are made fit only for the Gold, the Silver being untouched.

When Minerals are corroded by acetous *Menſtrua's*, we are not therefore to think, the ſame always to be reſolved into Elementary parts: that the Salt and Sulphur of them, may be had ſincere or unmixt, by this means (altho' ſome boaſt, that they are eaſily able to ſhew ſuch Analyſes of Metals) for that it appears to our obſervation, and frequent experience, that many of theſe are of ſo compact and ſolid a Concretion, that they cannot be broken, but into integral parts: as for example, Gold and Quickſilver, after what manner almoſt ſoever handled, when they are reduced into manifold Calxes, will at laſt by a ſtrong fire acquire their proper forms: *viz.* the ſaline Particles of the *Menſtruum*, looſen the bond of Concretion, whereby the moſt minute integral parts of the mixture ſtick one to another; but the ſame ſolvent, is not able in all things, to break aſunder the *Copula* of the firſt mixture, whereby the Elements are mutually bound together: ſo that for the moſt part Metallic Calxes, are only little bodies of the Concrete, broken into moſt ſmall little Globes, being involved by the ſaline Particles of the *Menſtruum*: Wherefore, fire being applied, thoſe corroſive Salts being pulled away from their Embrace, are wholly driven away; then the Metallic little bits, or duſt, as ſo many little particular Globes being fuſed, by the intenſe heat, coming together into one Maſs by melting, reſume the Species of the Metal: wherefore, they who commonly affirm, that the Salts of Minerals, for the moſt part, are only the ſaline Particles of the ſolvent, conjoyned with the Metal, reduced as it were into fine flower, without doubt ſpeak truth in the preparations of Sol and Mercury, or of Gold and Quickſilver; alſo the Salt or Sugar of Saturn or Lead, is nothing elſe: But that ſweetneſs comes only from the Vinegar; for if in the diſtillation of Vinegar, the joynings of the Veſſels are cloſed with Clay, and Salt, Chaulk, and Horſe-Dung, on the ſuperficies of this, grows together a moſt white Salt, wonderfully ſweet, in every thing like to that Sugar: but from ſome, *viz.* from Iron, Copper, and Silver, are prepared fictitious Vitriols, which are for the moſt part ſaline: For that the ſame, by diſtillation, may be forced into acetous Liquors, as the Metallic recrements.

Beſides the ſolvence hitherto recited (which, by means of the Particles, which are ſtrong in them, act upon a peculiar and determinate matter) I know that Chymiſts do boaſt wonderful things, of a certain univerſal *Menſtruum*, by whoſe inſpiration, every body whatever, may be eaſily reduced to its Principles, or firſt Elements: And tho' *Helmont* have bragged, that he had attained to this Secret by his own Labour, and now daily the Adepti of Chymiſtry, do aſpire to this end; yet the hopes and endeavours of moſt, have failed them in this work, even as in the Philoſophers Stone. There are alſo ſome other famous *Menſtrua's*, *viz.* The *Aqua Vitæ* Tartariſated of *Quercitan*, and his Philoſophic Vinegar, which are of noted uſe in the preparing of Medicines;

Medicines; but ſince I know nothing, or any ſtrange thing they have done, in the diſſolution of Bodies, we will paſs them over.

So much concerning ſolvent *Menſtrua:* about bodies to be diſſolved, a certain proviſion ſhould be inſtituted, whereby indeed their complections may more eaſily be unlocked, and cut into moſt minute parts: Wherefore the Concrete is now pounded into powder, now cut into little bits, that the way might lye open for the ſolvent, to its moſt inward receſſes. If that the frame of the ſubject be harder, and more ſtrict, that it will not give place, but of a long time, to the *Menſtruum*, before the diſſolution is begun, there ought to be adminiſtred ſome aperitives, or openers, whereby the Concretion may be firſt looſened, and ſomewhat opened: wherefore, the Tincture of Steel, is more eaſily extracted, if its filings be ſprinkled with the Juice of Limons, or the Spirit of Vitriol: in like manner Harts-Horn, or the ſhavings of Ivory, are handled when we would have the Decoctions of them quickly made: when formerly I have been very ſolicitous about this thing, *viz.* that I might render the more hard bodies eaſily ſoluble, in any *Menſtruum*, and that I had eſpecially tryed many things about Iron; after ſeveral experiments, at length, by a certain chance, and almoſt thinking of ſomething elſe, I found out a preparation, whereby without any Corroſive, or Acid Liquor, by the mediation only of a gentle heat, the body of Iron is opened, that being reduced into powder, gives immediately a tincture, to any Liquor, that neither Salts themſelves, are ſooner diſſolved in common water: By this means, I am wont to prepare ſuddenly, in great quantity, Mineral waters, which exactly reſemble our *Tunbridge* Spaws; and to render Wine, Beer, Milk, or Whey, with no trouble Chalibeated. By this means, Syrups, Tinctures, Extracts, or *Magiſteria* out of Steel, are moſt eaſily to be had. Moreover, plainly by the ſame Artifice, Corals, Pearls, Eyes, and Claws of Crabs, and all ſhelly things, are prepared, that their powders preſently impart to any *Menſtruum*, a tincture, or the vertues of the whole Concrete. And in this preparation, no ſtrange quality is introduced to the Subject, nor its own proper quality loſt.

When I had, by this means, learnt to unlock all Bodies whatſoever, conſiſting of a ſaline bond, preſently from the Analogy of this, was made known the means of unlocking Subjects, whoſe Concretion is wholly ſulphureous: for I am wont ſo to prepare common Sulphur, that its powder immediately impregnates any Liquor, with the tincture and vertue of Sulphur. The Spirit of Wine, ſuddenly contracts a deep colour, and very red, that being put into it. Common Water by the infuſion, or decoction of the ſame Powder, is rendered clearly ſulphureous, and gilds Silver, and by this means, from that Tincture, a præcipitation being made of White Wine, or Vinegar, the Milk of Sulphur is eaſily prepared, in great quantity. Out of ſulphurated Wine by this infuſion, I make a Syrup, than which there is ſcarce found a more excellent remedy, in the diſtempers of the Thorax. By this means, Tinctures, Extracts, Magiſtries, are prepared from Sulphur, with no labour, and without any ſmatch of the fire. By the ſame way Preparations from Amber, Benzoin, and other ſulphureous things, eaſily diſſolvable in any *Menſtruum*, are compoſed. But enough, and too much of this: we will now paſs to the other great diſſolvent of Nature.

CHAP. X.

Of the Nature of Fire: and by the way of Heat, and Light.

WE may almoſt pronounce the ſame thing of Fire, what the Philoſophers of old did of the firſt Matter, to wit, that it was potentially every where, and in all things; but in none, in act. For among theſe ſublunaries, Fire hath got no exiſtence of its own Nature, or certain means of duration: It is produced almoſt in every Subject, but is retained long in none, but it ſuddenly vaniſheth, and expires: yea, unleſs ſome external accidents, oftentimes ſhould concur for its production, I think it had not at all been in the World. Some have dreamed, that its Sphear is ſcituate under the Moon: but this was introduced only, for the making the Hypotheſis of the four Elements: for ſuch a thing ſeems conſonant neither to Senſe, nor Reaſon. That we may rightly ſearch out the Nature of Fire, we muſt ſeek in what Bodies it is chiefly to be found, and how they are diſpoſed; and then we may proceed to the unfolding its eſſence.

The Subjects moſt convenient both for the producing, and the maintaining of Fire, are of that kind, in which there are very many Particles of Sulphur, and but only a moderate portion of Water, Salt, and Earth: for theſe do hinder its inkindlings, and being plentifully poured on it, extinguiſh it being inkindled: Wherefore Bituminous, Fat, and Oily things, quickly take flame

flame: ſo alſo Chips, Straw, light and dry Wood: in the mean time, Metals, Minerals, the Glebe of the Earth, Dung, wet Straw, and green Wood, are hardly, or not at all, to be inkindled.

Secondly, We obſerve, that all the time the Fire continues in the ſubject, ſulphureous Particles fly away in heaps, and from the departure of theſe, the ſubſtance of the burning body is by degrees deſtroyed; in the mean time, very much of Salt and Earth, remains in the form of Aſhes, after the burning.

There is a third Obſervation, that when the ſulphureous Particles are wholly, or for the moſt part flown out of any ſubject, the burning wholly ceaſes, and the form of fire is quite deſtroyed; nor can it be renewed in the remaining matter, wanting of Sulphur.

Fourthly, We will note, that ſometimes ſome Bodies conceive a burning without the advention of another fire, only by their own effervency, and by the inteſtine motion of the implanted Particles, and of their own accord are reduced into Aſhes; as when wet Hay is laid up cloſe, it firſt grows hot, then afterwards breaks forth into ſmoke and flame; or the Wheels and Axel-trees of Carts or Wains, being heated by too great agitation, are inkindled.

According to theſe Poſitions, we may affirm, that the form of fire, wholly depends upon ſulphureous Particles, heaped up in any Subject, and breaking forth from it in heaps: and that fire is no other thing, than the motion and eruption, of theſe kind of Particles, impetuouſly ſtirred up. For Sulphur is of an exceeding fierce and untamed Nature, whoſe little bodies, when (the yoak of the mixture being ſhook off) they begin to be thickly heaped together, diffuſe themſelves on every ſide like a torrent, break whatſoever obſtacles are in the Subject, deſtroy whatever comes in oppoſition, or fling it down headlong. Nor do they only unlock their proper Subjects, but alſo lay open the gates and doors of any other Subject near, that they can reach to, and there incite to the like fury, all the conſimilary Particles of Sulphur, and provoke them to an eruption: wherefore fire every where inkindles fire.

The ſulphureous Particles, while they, heaped together within the confines of their ſubject, or on its ſuperficies, are agitated with a rapid motion, but are detained by the Embrace of other little Bodies, from a more free eruption, and more aggregated, conſtitute the form of fire; as is to be ſeen in burning Coals, or in glowing Iron; but when theſe ſort of Particles fly way by heaps, from the ſame ſubject, and bound together, they produce flame, which is only an heap, or rather a torrent, of the Particles of Sulphur flowing together, and conjunctly flying away: if Watery, Earthy, and ſaline Particles, are commixt with the ſulphureous breaking away, and are able to disjoyn and ſeparate them, only ſmoke is excited; which afterwards, the ſulphureous little Bodies more plentifully breathing forth themſelves, and getting together, breaks forth into flame.

The inkindling of Fire happens very many ways. The firſt and moſt ſimple is, when from hard Bodies ſtruck one againſt another, but oftneſt from a Flint ſtruck againſt Steel, ſparks of fire break forth; which being received in Tinder, made of a Linnen Cloth burnt to blackneſs, dilate themſelves, and then a Match, or ſulphurated thing, being applied, they cauſe the inkindling of a flame. Secondly, A Fire often happens in dry Wood, and dry things, when by the too great attrition of the parts, and agitation, being made hot, they conceive an inkindling of their own accord. And thirdly, when Bodies abounding with Sulphur, as Hay, or Flax laid up wet, (of which mention was before made) grow hot of their own accord, and afterwards are inkindled. The fourth way, is the moſt uſual, of introducing fire into any Subject, that it may be inkindled by another fire. We will a little more conſider the ſeveral proceſſes of theſe.

1. Hard Bodies ſtruck one againſt another, ſhake forth little ſparks of fire: as a Flint with Iron, or with a Flint; *Indian* Canes, the Fire Stone, and many other things. The reaſon of this is, becauſe the Particles of Sulphur, which reſide in the Superficies of a hard Body, if they are ſmitten by another hard Body, are not able to go back inward, (becauſe in hard things there is not afforded any ceſſion of the parts, from place to place) nor can the ſmitten Particles of Sulphur evaporate by degrees; but that by reaſon of the vehemency of the ſtroke, they are neceſſitated to break forth in heaps: Wherefore, when by this means, many of them are moved together, and are aggregated, they exhibit the apparition of fire. The ſparks being received into the half-burnt Linnen or Tinder, are dilated into a greater fire, for that the ſulphureous Particles, in ſuch a ſubject are eminent, and are brought, as it were, to the very top it ſelf of eruption or breaking forth, wherefore by the leaſt ſpark being moved or ſtirred up, a way being made they fly away.

The very ſame reaſon is for Wood, being made hot, and afterwards fired, by too great attrition; by which means, the Axel-trees and Wheels of Chariots, or of Mills, are frequently fired: for the Sulphureous Particles, being by this means very much moved, are more thickly heaped together; and when, having as it were made an Army, they are able to remove, or ſtrike away the reſt, they preſently break forth in Troops, and by their going away, cauſe a burning.

In

In Hay or Dung laid up wet, the Particles of Sulphur very much abound; which having gotten the watery Latex for a Vehicle, run themſelves into motion; but when for want of Ventilation, they cannot by little and little exhale, being ſtraitned within, and ſo brought into their exaltation, they are able to joyn more one to another, and mutally to incite themſelves: then afterwards, being very much heaped together, they unfold themſelves more largely, and begin to break the Dens of the Subject, and ſo produce a burning. For it is to be obſerv'd in any Subject, when the Particles of Sulphur, being more ſlowly moved, fly away by degrees, neither heat, nor fire, but only a drineſs, and leanneſs ſucceed. But if they are more rapidly moved, than that they may be able to exhale leiſurely, a heat is ſtirred up in the Subject: then if yet they are agitated more vehemently and impetuouſly, and being more thickly agglomerated, or heaped together, they break forth in heaps, a deflagration or flame follows the heat.

Fire being enkindled in any Subject, enters and enkindles whatever Sulphureous thing is next it. For as Saline *Menſtrua*, *viz.* Stygian waters, aſſault Metals, ſtuffed with Mineral Salt, and looſen their ſaline Particles, as being of kin, from the mixture; ſo alſo the ſulphureous Particles, being enkindled, break whatever ſulphureous particles are next them, and ſtir them up into the like motion of Burning, with themſelves.

Thus much concerning the Nature and Production of Fire: it remains that we next enquire into the Effects of Fire, and alſo concerning its Virtue and Efficacy; to wit, what kind of Bodies it diſſolves, and by what means; and alſo what uſes it ſerves for. The chief Effects of Fire are Heat and Might; either of them are excited by Emanations or *Effluvia*, ſent from an enkindled Body; but after a far different manner; for truly, Heat is moſt often produced at a diſtance, without Light; alſo Light, without any ſenſible Heat.

Heat, foraſmuch as it belongs to the Senſe of the Touch, is conceived, when a certain Paſſion is induced in the skin, or any other Organ of the Touch, whereby the little Fibres and nervous parts are drawn aſunder, moved into light ſpaſms or convulſions, and ſometimes (if the ſtroke be vehement) ſuffer a ſolution of the Union. This is wont to be done, either by the bringing near of Fire, or of another Body made hot by Fire, or by ſome other means: For from either, the ſulphureous or warming particles being excited, into a more rapid motion, and breaking forth by heaps, ſpread abroad, which, as ſo many little darts, being thruſt into our skin, or other Senſory of the Touch, either by tickling gently, they bring to it a pleaſing ſenſe of heat, or by ſtriking it more grievouſly, the troubleſom ſenſe of burning or ſcorching.

For the effect of Heat, Fire is applied to Bodies, either immediatly, and ſo either for the ſake of burning, roaſting, or boyling; or mediatly, *viz.* by the interjection of another Body. Bituminous things, Coals, and other things dug out of the Earth, alſo Vegetables, and chiefly their Leaves, and Woods, are burnt, for heat, neceſſary for human Uſes, and for the producing, and conſerving it. Stones are burnt for Lime; Vegetables for the preparing of Salts. The Fleſh of Animals is wont to be roaſted, and the Fruits of Vegetables; whereby they may become better food for men: For by roaſting, the ſuperfluous humidity is evaporated, and the ſulphureous parts being ſtirred by the neighbouring heat, are placed in their vigor and exaltation, by which means, they afford a more grateful food to the Palat, and of better digeſtion to the Stomack. By Fire Metals are fuſed or melted, and moſt Minerals, whereby they are either very much purified, or they are better formed into various figures by Smiths. Metals, and very many Minerals, alſo Salts, although they are not enflamed, and take a firing (becauſe they abound with leſs Sulphur, than Salt) yet by a violent fire, they glow, and ſuffer a fuſion; for that the ſulphureous particles of the Fire, enter the ſaline little Bodies, though moſt compact, and diſſociate them for the time; which however pulled one from another, preſently the Fire being exhaled, come again together, and are ſtrictly united.

Secondly, When Fire is mediatly adminiſtred, the particles of the ſoluted ſulphur, and heaped together into fire, are diſſociated, as when a Cloud is diſperſed into moſt little drops of Rain; wherefore they lay aſide the form of fire; but though diſperſed, they eaſily paſs through any impediment, and induce a ſufficient ſtrong heat to every Subject. By this means, Fire is accommodated to very many uſes, the chief of which, and the more accuſtomed, are, elixation or boyling, digeſtion, and diſtillation.

In Boyling, the Particles of heat do paſs into a watery *Menſtruum*, and being united with its particles, inſinuate themſelves deeply into the thing to be boyled: whoſe ſuperfluous humidities they carry away, digeſt the crudities, and carry them into a ſtate of maturity. Boyling is inſtituted, either that the Liquor might be impregnated with the ſtrength of the thing to be boyled, or that the thing to be boyled might be made tender, by the Liquor entring into it, and its Particles exalted: for Meats and all eatable things are rendred more grateful to the Palat by boyling, even as well as by roaſting.

Digeſtion is very much uſed in Medecines, that their more ſlow Particles may be carried to a greater activity; and ſometimes, that they being too fierce, might be fixed, and rendred more mild.

The moſt noble uſe of heat, or of mediat fire, is had in diſtillations; for the Particles of heat

heat, do pull away ſome Particles of the ſubject from others, (as it were by a Spagyric Anatomy) they reſolve all Bodies, into their parts and principles. But the conſideration of this thing, is too laborious and hard, to be inſerted into this Tract.

As heat reſpects the ſenſory of the touch, ſo light that of the ſight, and affects it ſo after a proper and peculiar manner, that nothing at all is diſcerned, beſides the rays of light, direct, or reflected: for the various appearances of Colours, and the divers proportions of Bodies, and whatſoever we ſee with our Eyes, is only light; to wit, either proceeding directly, or ſtrait from a lucid Body, or retorted from another Body, to the Eye, & ſo formed into various figures & colours. The conſideration of Light, contains in it ſelf, very many ſtupendious things, and is of deep ſpeculation; which are not however proper for this place: It will ſuffice to take notice here, of a few things, concerning its Original, Motion, and Perceptibility.

Light is wont to be diſtinguiſhed, either that it is Etherial, which flows from the Sun and Stars; or Elementary, which only proceeds from a fired Body, enkindled into a flame. It ſeems, that either is only flame enkindled in a greater dimenſion, and dilated into a moſt thin compoſition: for it appears to the ſenſe, that from ſulphureous things being inflamed; (as for example) from a burn-Candle, moſt thin *Effluvia's*, or moſt ſmall divided little Bodies perpetually do ſpring; which being diffuſed into an Orb, and ſtretched forth into right Lines, as it were from the centre to the circumference, are ſtill expanded on every ſide, in a great heap, and fill all the ſpace within the ſphear of its activity, with a luminous ray. The Particles of the flame, which firſt fall away or depart from a lucid Body, are ſtill driven forward by thoſe following behind; and ſo theſe alſo by others; and ſo by a continued ſeries of Particles of the flames ſtill ſucceeding, the beams of light are formed, and are thickly or cloſely directed into all parts.

The motion of theſe is exceeding ſwift; like ſtreams of water, breaking forth with a force, they paſs through the medium in the twinkling of an Eye, and, as thoſe waters, if the motion be cut off near the Spring, moſt ſwiftly vaniſh. When the Rays of light come directly from a Luminous Body, they conſtitute a medium, only clear or lucid, without the appearance of any colour or image: when the ſame Rays meet with a ſolid Body, they do not paſs rightly through it, but being either broken off, they are drowned or loſt, or elſe they are reflected and leap back or rebound, as when a Ball being caſt againſt a Wall, with a continued motion is ſtruck back, upon other parts, according to the Angles of what ſtopped it. The Rays of light, reflected from other Bodies, being fallen into the Eye, repreſent the Images of viſible things, and the varieties of colours. For as the ſuperficies of viſible Bodies are rough, and endued with little pores, and innumerable eminences, or riſings up, hence the Rays of light, being moſt thickly impacted in them, and reflected from every part, according to all the ways of inclinations, and directions, as far as they go, do meet together round about, into very many tops of Cones, in which the beams proceeding from the whole object, as from a baſe, repreſent the image or ſimilitude of the whole; and in theſe kind of images, the medium is every where planted, that wherever the Eye is placed, it beholds the image of the ſame thing, though not wholly after the ſame manner. But foraſmuch, as the beams of the ſame light, being impacted in every Body, and variouſly refracted and diſtorted, about its rough and unequal ſuperficies, from thence reflected as it were with turnings and windings into the Eye, they cauſe the diverſe Phænomena, or appearances of colours, to appear. For colours, and images of things, do not exiſt in their own nature, but as it were ſpectrums, only from another place, change their apparitions by the Rays of light. When dark night brings thick darkneſs to this inferior World, things are not perceived, but by the Touch, and loſe all their appearances: when the Sun reviſits the Hemiſphere, he brings forth a new Creation of things; and the whole Atmoſphere is filled at once, with a ſudden and manifold progeny; to wit, with infinite images of Bodies, and appearances of colours.

Therefore Light does not only illuſtrate the medium, that ſight may be made, as ſome would have it; but it alſo creates the very objects of ſight, and introduces them into the Penetralia or inward parts of the Eye, yea, to the moſt inward receſſes of the Brain. This doth the ſame Office for the Eye, as the Intellect doth for the Soul, to wit, it forms the *Idea's* or Images of Bodies, and renders them perceptible by the viſive faculty. Light only is able to penetrate the Coats and Humors of the Eye, to move the little Fibres of the Optic Nerve, and to ſtir them up into an act of ſenſation. Becauſe the Images of things, being forged by the Rays of light, variouſly reflected, and meeting together on the tops of the Cones, are ſtayed within the Pupil, or dark ſpot of the Eye; they ſeem as objects in a cloſe Chamber, admitted by a ſmall hole, to be repreſented to the life: and the Concave or Convex Glaſſes, whereby the parallel beams are broken, or the inverſe reduced or brought back, do egregiouſly ſupply the humors placed in the Eye, beyond the induſtry of human Art; by the help of which, the image of every object is painted, near the thin skin of the Eye, in its juſt figure and proportion: and then, from the motion, which this Image impreſſes on the little Fibres of the Optic Nerve, the act of ſight is performed in the Brain. Thus much for Heat and Light, the Speculation of which, tho' it may ſeem to be altogether beſides the Doctrine of Fermentation, yet foraſmuch as by the motion of

these kind of Sulphureous Particles, many other Physical Operations are also performed, a brief mention of them ought not to have been overpass'd in this place. But before we shall lay aside quite the consideration of Fire, it will be here worth our while to inquire concerning some Subjects, as it were irregular, to wit, in which fire shews admirable vertues, and beyond its common manner: of this sort, are among Simples, common Sulphur, and *Sal Nitre*; among Compounds, Gun-Powder, and *Aurum Fulminans*.

Concerning common Sulphur we may observe, that it quickly catches fire, heat it immediately breaks forth into flame, such (as nothing besides) that by its deflagration it puts out the Kitchen-fire, that it sends forth a bluish flame, and whitens all objects with its smoke or soot. If you behold the matter of this Subject, or the parts of which the mixture is composed, its Spagyrical Analysis will exhibit great plenty of pure Sulphur, a moderate quantity of Vitriolic Salt, a little of Spirit, Water and Earth. For when common Sulphur is dissolved, by the Spirit of Turpentine, the Sulphureous part impregnates the *Menstruum*, with a very deep Tincture, and the Saline grows into Crystals: or when it is fired under a Bell, the Sulphur wholly burns, in the mean time the Salt being resolved, and having taken a Flux, is fixed about the sides of the Vessel, and so exhibits a Liquor, most like the Spirit of Vitriol, or rather the very same. To which add, if you mingle the Oyl of Vitriol, and Antimony together, and distill it in a Retort, a Yellow Sulphur, just like the common, will be Sublimed in the neck of the Retort.

I say therefore, because there are very many Particles of Sulphur in this Concrete, and that they lie loose and unbound in the mixture, (to wit, neither divided and separated by the coming between of Earth, or Water, nor much bound together by Salt) therefore they are of a most prompt motion: wherefore by the least spark of fire, they break forth from the loose frame; and because very many run forth adoors together, therefore not a naked fire, as in every combustible thing besides, but first of all and immediately a flame is inkindled. Its flame becomes bluish, because 'tis almost pure Sulphur that burns, not mixed with the Particles of Water and Earth, as it is in Wood or Straw. The very same thing happens to Spirit of Wine being inflamed. It extinguishes the Kitchen fire, by reason of the little Bodies of Vitriolic Salt left behind; and the same being eventilated with the flame and fume of Sulphur, gives a white colour to things; the like to which, the *Effluvia's*, exhaled from the Spirit of Vitriol, or Stygian Waters, do effect.

Concerning *Sal Nitre*, we will take notice, that it is not to be inkindled at all by it self; but to be melted by an intense fire: but being mixed with any Sulphureous things, it breaks forth into a flame, with a certain force and explosion: For being added to common Sulphur, Antimony, or Tartar, it burns with a thundering noise; also if you put into melted Nitre, a burning Cole, or Wood, the flame is exploded round about, with a wind, so that the matter put in is flung up and down here and there, and often times flung clear out of the Vessel: by this kind of deflagration, what is Nitrous is consumed, the fixed Salt (which is Tartar) remains. When Nitre is distilled, Sand or Brick dust, is mixt with it in a double quantity at least; otherwise the Nitre melting is not at all loosened into a vapor. In the distilling the vapor sent forth is very red; so that the Receptacle shines with a splendor, as if a flame were shut up within it: a sharp corrosive Liquor is stilled forth, which dissolves most Metals, also Gold.

These things being truly weighed, it seems that this mixture consists chiefly of abundance of Salt, and a little Sulphur, but these not fixed and idle, but either exalted, and ready for motion, and not without a certain resistance bound together: to wit, the sulphureous little Bodies, being rouled about by the saline, and as it were strictly pressed, still endeavour to get forth; but being strictly bound within, they are not able to rise forth by their own strength, or endeavour: but as soon as, by the mixture and inkindling of another sulphureous Body, the Particles of the Salt are disjoyned, and their Prisons unlocked, presently the included little Bodies of Sulphur, as it were breaking Prison, fling themselves forth with violence, remove every Obstacle, and strike the Air violently with a sudden eruption.

The reason why fire doth not inkindle Nitre, being inclosed in a Vessel, but only melts it, when in the mean time, any sulphureous matter being fired, makes it to flame forth with a noise, is, because the little Bodies, which fall away from the fire, enter the Nitre, make it a little loose, and dissociate the concretion of the Salt, but not so loosen it, that a way may be made for the included Sulphur: but by the addition of sulphureous things, the saline compaction is more dissolved, and is so far unlocked, that the Particles of the inclosed Sulphur fly away all together, and being freed from their straightness, do hugely stretch themselves abroad, and seek greedily an immense space.

That there is plenty of Sulphur in Nitre, besides its deflagration, the Genesis of it sufficiently testifies; for it is begot chiefly in places, where the sulphureous Excrements of Animals abound. The use of it in agriculture argues the same thing, because the fertility of the Earth depends very much upon it: And to this also, the flaming colour, shining in the distilling may persuade.

From these premises, it will not be difficult, to unfold the nature of Gun-Powder, used in Warlike Instruments. For the sudden firing, and vehement explosion of it arise, for that those very

very many, and almoſt infinite Particles of Sulphur, which conſtitute that fire-dilating Body, being fired, fly away together in a moment; all which breaking forth at once, a force being made, and deſiring a moſt free and ample ſpace, for their expanſion, violently move the Air, and all obſtacles, and ſo are exploded, or thruſt forth with a noiſe. There is in this mixture, common Sulphur put, becauſe its Particles are looſe, and ready for motion, and therefore apt to move a quick inkindling: there is added Charcoal duſt, becauſe in that alſo, the little ſulphureous Bodies (as is ſeen in Tinder, that is made of half-burnt Linnen) are brought to the very top of eruption; and therefore theſe preſently conceive an inkindling, and both theſe being fired, and oppoſed to the Nitre, they quickly looſen its frame, and ſend forth the ſulphureous Particles incloſed in it; which indeed break forth from their impediments with a force, and as the blaſt of a Bellows, encreaſe the ſtrength of the whole in firing. The Charcoal duſt is added in a moderate quantity; though it abounds with Terreſtrial matter, yet by reaſon of the Sulphur being carried forth in it, it accelerates the deflagration of this mixture: For the Coal and Nitre being beaten together, is ſooner fired, and with a greater exploſion, than Nitre and Sulphur: but if the Coals be added to this Compoſition, (as they are wont to make it for Cannon and great Guns) in a greater quantity than it ought, and improportionate to the Nitre, the immediate firing is ſomewhat retarded, by reaſon of the interjection of the Earthy matter; and it happens, that the ſulphureous little Bodies therein, apt to be too haſtily inkindled, are a little disjoyned, and ſo the ſubſtance of the infuſed powder, takes fire ſucceſſively, and by parts, and not all at once.

The reaſon of *Aurum Fulminans* does not ſo manifeſtly appear: but it ſeems wonderful, that the Calx of a Metal, otherways inviolable by fire, ſhould be brought into a powder, one grain of which, if it be but lightly heated by fire, is exploded with ſo great a force, and yields ſuch a noiſe, that is an hundred fold beyond Gun-powder. I know many deduce the cauſe of this, as in Gun-powder, from a Nitrous-Sulphureous mixture: For they ſuppoſe the Nitre drawn forth from the ſolvent *Menſtruum*, to joyn together with the Sulphur of the Metal, and ſo the powder from thence prepared, to get that fulminating force. But in truth, if this matter be better thought on, it will appear far otherways; becauſe this golden thundring powder, is not at all inkindled, as preparations of Nitre with Sulphur: for if fire be put to it, it goes off only ſucceſſively, by grains, nor as in Gun-powder, doth the whole fulminate at once; but being put into an Iron, Silver, or other convenient Veſſel, and for ſome time heated, by a ſudden fire, at length all the Particles being ſtirred together into motion, it is exploded with a mighty noiſe; but yet being exploded, it yields neither flame nor ſparks, neither is the Gold loſt. For if this powder fulminates in an open Veſſel; whatſoever is of Gold, remains after the thundring, in the form of a purple powder; and may be gathered up. That the genuine cauſe of this may be extricated, there are ſome things to be obſerved, concerning its preparations, which will give no ſmall light.

For the making of this powder, it is altogether requiſite, that a ſolution of Gold be made with a *Menſtruum*, impregnated with Sal Armoniack, or at leaſt Analogical to it: for I have tryed it in vain with the Spirit of Nitre, Salt, with the Bezoartic Spirit, and ſome others. Then next it is requiſite, that the Calx be precipitated with Oyl of Tartar; for if the ſame be brought into a powder, with Silver or Mercury being caſt in, it loſes its thundring force. Alſo, if the Liquor of the Tartar, be too precipitately poured in, that with the great heat, a repercuſſion of the thing ſoluted be made, it often loſes its fulminating vertue: but a precipitation being leiſurely made, the powder ſetling in the bottom is waſhed away, by the often pouring on of warm water, which, though it be moſt often waſhed and dryed, far exceeds the weight of the diſſolved Gold.

According to theſe poſitions, it ſeems moſt likely, that whilſt the Gold is diſſolved by an appropriate *Menſtruum* for this buſineſs, ſome little Bodies of *Sal Armoniack*, (or ſome other reſembling it) being greatly akin to the Gold, do moſt ſtrictly cohere with its Particles; which then by the Salt of Tartar leiſurely in the precipitating infuſed, are more fixed, and more ſtrictly tyed faſt together: and then the exploſion of this powder, or ſolary Calx, is nothing elſe than a violent eruption of thoſe kind of Salts, from the Coheſion or Embrace of the Gold. For when the powder prepared after this manner, is brought to the fire, or is otherways made hot, the heat cauſes the *Sal Armoniack* Particles, or others of the ſame nature affixed to the ſolar, to diſſociate; which notwithſtanding, (when they hardly depart one from another) are not pulled aſunder, but by a ſtrong and continued heat: yet afterwards being pulled aſunder with a certain force, by reaſon of the ſudden and violent breaking off, they ſtrike the Air impetuouſly, and ſo cauſe a moſt ſtrong noiſe, for their bulk. But in the mean time, if the exploſion be made under a Silver Spoon, you will ſee a ſeparation made of either Particles, here the ſolar of a Purple colour, there the ſaline of an Aſh colour. But that this powder doth not make a noiſe, unleſs it be leiſurely precipitated with the Oyl of Tartar, it is becauſe ſome Particles of the Salt of Tartar, being before bound together with the *Sal-Armoniack* Particles, do couple together, by which means all are more ſtrongly combined: For the Salt of Tartar being pounded with the mixture of Nitre and Sulphur, fixes their Particles for a time; that this Compoſition is not pre-

ſently inkindled by heat; but afterwards is exploded with a ſtrong noiſe. And powder prepared after this manner ſeems to imitate the nature of *Aurum Fulminans:* and it is probable that from other Minerals diſſolved and precipitated by reaſon of the ſtrict Coheſions of the Salt with the Metallick matter, and their violent abruptions, thundering Calxes may be prepared. That truly the preparation of this chiefly depends on the Combination of the Salts, it appears, becauſe, if in the precipitating (as I have known it ſometimes to have hapned) the Oyl of Tartar, being too haſtily infuſed, the Complexion of the Salts is diſſolved with the Metallic matter, the powder falls in ſmall quantity to the bottom, and of a very Purple colour, whoſe grains are fragments of almoſt moſt pure Gold, and therefore they do not fulminate at all: afterwards in that precipitated Liquor, very many ſlender Cryſtals grow together, which are indeed the Salts, having ſuffered a Divorce from the Metal. Beſides, that the Salt of Tartar, brings ſomething to the preparation of this powder, it is a ſign, becauſe thoſe things which take away the fulminating force from this, are of the ſame Nature, which chiefly work upon the Salt of Tartar; as a beating it together with common Sulphur, Spirit of Salt, Oyl of Vitriol, or of Sulphur: for theſe grow hot, and greedily deſire to be joyned with the Salt of Tartar, and ſo they call it away from the Embraces of the Gold; by which means the Combination of the Salts, with the Particles of the Gold, is looſned, and therefore loſes its Gun-like force. What is commonly ſaid, that this powder will be preſently inkindled, or exploded, by a moſt light heat, or by ſhaking it in an Iron Ladle is nothing true, as appears to me, for I have often tryed it. Nor is it more worthy of belief, what is ſaid, that this only forces downwards, and breaks the thickeſt hollow Pipes with its force; in the mean time, that it doth not move or ſhake any thing laid over it, becauſe long ſince I made tryal after this manner; Two grains of this being laid in a Silver Spoon, I covered with a Doller, then a Candle being held under the Spoon, upon the exploſion of the powder, there followed a great noiſe, and there was a little hollow made in the bottom of the Spoon, almoſt through, and the piece of mony was carried up with a force to the Cieling, wherefore, when this *Aurum Fulminans* is exploſed, its force is diffuſed round.

Altho' vehement heat, and incited, and alſo the emiſſion of Smoke and Soot, depends for the moſt part upon fire; yet ſometimes we perceive it to be produced in ſome ſubjects, and that in a very high degree, without its being actually inkindled. A moſt known inſtance of which thing is, quick Lime ſprinkled with water: which alſo Stygean waters ſhew, being mingled with Iron, the Butter of Antimony, and with the Salts of the ſtagma of Vegetables. The learned men, *Gunter*, *Conringius*, *Hogelandus*, and almoſt all that have touched on the Doctrine of Fermentation, have delivered the effects of this Nature, as eſpecial examples of Fermentations, wherefore it will be worth our labour, to inquire ſomething concerning each of them: but on this condition (which I alſo have obſerved in other diſquiſitions) that I willingly let alone the opinion of others; for a Traveller had rather drink at the Fountains themſelves: I will then as briefly and ſuccinctly as I can diſpatch the buſineſs.

Quick Lime is made of the Lime Stone, alſo of many others (excepting only ſuch which conſiſt of a reddiſh, and as it were ſandy grain) being Calcined in a cloſe Furnace for many days, with a reverberating fire: by this means, the frame of the mixture is looſned, that it goes into a friable matter, or that may be crumbled, which by reaſon of the high aſtriction or binding nature, in which it excels, ſerves moſt excellently for the making of Cements for Walls: This Calx or Lime being taken from the Furnace, retains ſtill the form of ſtone, and ſeems cold to the touch, but water being poured thereon, it ſwells up, and grows wonderfully hot, ſending forth ſmoak, that it burns all Bodies that are put into it, beſides it falls of it ſelf into a white duſt: To which Particles this motion and heat ought to be aſcribed, *viz.* whether to thoſe implanted in the Lime-ſtone, or to the others acquired by the fire, doth not eaſily appear: but that we may looſe this knot, if we can, I have inſtituted this Analyſis of quick Lime. I put about half a pound of it into a large Cucurbit, then water being poured thereon, I fitted the little Head with a capacious Receiver; by and by, within five minutes of an hour, the matter began to ſwell, and to grow very hot; then a ſmoak, and a breath being raiſed, all the Veſſels became ſo hot, that I could ſcarce touch them with my hands. A clear water diſtilled forth into the Receiver, about ſix Ounces, which was not ſharp, but of a Styptic or Aſtringent ſweetiſh taſte; the remaining powder in the Cucurbit, I boiled with common water, and the Lye thereof made, I endeavoured to boil away with a gentle fire; while it did evaporate, there gathered together on the ſuperficies of the Liquor, a white and cruſty little skin, alſo of a ſweetiſh taſte, and the ſame being taken away, preſently a new one ſucceeded; the humor being at laſt wholly exhaled, there remained in the bottom nothing that was ſharp or ſalt.

We may collect from this, that this heat doth not proceed from the implanted Principles of the Lime-ſtone, *viz.* either ſaline or ſulphureous however moved within themſelves: for only a ſweetiſh Salt was to be found in it, which was alſo Volatile; and it is a ſign that there is not much Sulphur in the Lime-ſtone, becauſe by a long Calcination, the form of the mixture is not quite deſtroyed, nor its ſubſtance wholly broken: wherefore, it is very likely, that whilſt theſe ſtones are burnt in the Furnace, ſome Particles of fire do ſtrictly cleave to the ſaline, and ſo reſide

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in that mixture, as it were ſtrangers; which whilſt they lie aſleep, and continue idle, and being ſeparated one from another, by the coming between of Earth, although they are very many, do not raiſe up heat; For all heat depends upon motion: but when water is poured to it, thoſe fiery Particles, being thruſt out of their Cells, flow together, and fly away by heaps from that Inn; ſo breaking forth by Troops, they cauſe a very intenſe heat, and becauſe diluted with water, only a ſmoak, and not an actual fire.

It is a ſign that little Bodies of fire, or fiery Particles, do ſtick a long while in matters Calcined, becauſe Iron Inſtruments, according as thoſe Particles are driven forth of their pores, more or leſs, leiſurely or by heaps, become ſoft or hard; tough or brittle: moreover, it is obſerved, that Bricks, or freſh Earthen Veſſels, being dipped in water, cauſe a certain hiſſing; alſo Tobacco Pipes, if one end be put into water, and the other brought near to the Ear, yield a certain ſharp noiſe and rumbling: add to theſe, that fixed Salts being calcined, or having ſuffered a flux by the fire, become far ſharper; alſo Stygian waters, by reaſon of thoſe kind of little Bodies involved therein, which afterwards leiſurely evaporate, perpetually ſend forth ſharp fumes: and when theſe are poured upon ſaline Calxes, not only an Ebullition is raiſed, by reaſon of the diſagreeing Particles of the Salts, which ſtrike one another mutually, whereby they might be more ſtrictly combined; but beſides, heat and ſmoak ſucceed, which for the moſt part ariſe from the fiery Particles being ſhuck out of their Dens. But it is not eaſie to give a reaſon why quick Lime, and no other Concretes, retain ſo copiouſly thoſe kind of fiery Particles, and yield a ſtrong heat, water being poured on them.

'Tis plain enough, that when the ſulphureous Effluviums of fire, (foraſmuch as they are moſt penetrating) enter all Bodies whatſoever, brought near, affect them after divers manners: thoſe which are more lax, and ſtuffed with active Principles, are deſtroyed wholly by burning, and becauſe their ſubſtance decays, the fiery Particles, as Soldiers in a City ſpoiled by themſelves, do not continue long in the ruined place, but go farther, and move their Tents: but where the Concretion of the Subject is very compact, and that its Elements cannot be ſo pulled in pieces by the fire, that they rather grow ſtiff, as is ſeen in Metals, Glaſs, Bricks, and other things made hard, either by boiling, or fuſion; the fiery Particles entred in, being received in an incommodious Inn, preſently go forth again; and therefore few are wont to ſtay in mixt things of this kind, or in things fuſed, or calcined: but if fire be ſo applied to the more hard Concretes, of which ſort are moſt ſtones, and ſhelly Concretes, that the bond of the mixture be unlocked, ſome parts, *viz.* the watery and ſulphureous are driven away, and ſo ſome ſpaces are made hollow, very fit for the receiving any ſtranger; in the mean time, that the frame of the matter be not wholly deſtroyed, but that it may continue its compacted and ſtony form, which flows not away together with its Particles, and ever threatens its ruin; in ſuch a Subject, chiefly the Particles of fire, poſſeſſing the ſpaces of the parts flown away, copiouſly remain; and there cleaving cloſe to the ſaline little Bodies, being detained one from another, by the coming between of the earthy, lie quiet; which notwithſtanding afterwards, being violently driven from thoſe Inns, are able to produce by their eruption, an intenſe, and almoſt fiery heat: in the mean time thoſe ſaline little Bodies, are ſo looſned, by the long familiarity of the fiery, and by the embrace of one another, and of the ſtrangers, that they become Volatile, and being diluted with Water, for the greateſt part evaporate with it; and the remaining Salt, becauſe alſo Volatile, and having ſuffered almoſt a divorce from all the reſt of the Principles, is both ſweetiſh, and becomes deſirous of conjunction, and aſtringent; and therefore alſo is of excellent uſe for plaſtring of Walls.

But that Stygian Waters, being poured upon the Stagma's of fixed Salts, produce heat, and the ſame mixed with Iron, or the Butter of Antimony, ſtir up a mighty ardour, with a blackning ſmoak, the reaſon ſeems plain. As to the Stygian Waters, and fixed Salts, it may be ſaid that both theſe Concretes are only Salts, having got divers ſtates by the fire, and ſo either being very much ſtuffed with fiery Particles (which are the moſt minute atoms of Sulphur:) But they being confuſed together, do forthwith ruſh into mutual embraces, and becauſe the Particles of either, are made unlike, therefore, whereby they may be more ſtrictly united, there is made a great attrition of parts, and together an excuſſion of the fiery Particles, from whence the great ebullition, with a heat is excited: when the ſame *Menſtrua*, are poured on Iron, or the Ice of Antimo, the Salts of either come together, and ſhake forth the fiery Particles, and alſo the ſulphureous Particles, before implanted in either Subject; which flying away in heaps, cauſe a ſmoak with a heat, but not a flame.

CHAP.

CHAP. XI.

Of the Motion of Fermentation, as it is to be observed, in the Precipitation of Bodies.

WE have hitherto treated of the Solutions of Bodies; it remains now, that we speak of Precipitation: This is performed only in Liquids, which, when as they are ſtuffed with Heterogeneous Particles, are compelled by a matter Precipitating thoſe Particles, to ſeparate one from another, and to obtain for their ſubſtance, divers places and conditions: wherefore, ſince in this operation, there is an agitation and motion of parts, its conſideration ought to be referred to the Doctrine of Fermentation.

Precipitation is performed, either in Natural things, as chiefly in Milk, Blood, Urin, and perhaps in ſome others; or in Artificial things, which are of a divers kind and nature: but they may be deſcribed and ranked in a certain order, according as the Liquor to be Precipitated, or Precipitating, is either Spirituous, Sulphureous, Watery, or Saline: beſides, according as the Particles ſeparated from the reſt, are either Elementary, (*viz.* either Sulphureous, Earthy, or Saline) or Integral, which participate of the nature of the whole mixture, and are only very ſmall portions of it very much broken.

There are two common and known ways of Precipitation, whereby is made from Milk, both Cheeſe, and Butter: As to the firſt, if any ſharp thing be poured into warm Milk, the thicker and Cheeſie parts, preſently ſeparate from the ſerous and thinner, and are gathered together into a thick ſubſtance. The reaſon of which conſiſts in this: Milk has a ſomewhat thick conſiſtence, and its pores and paſſages are very much beſet, with the thicker (to wit, the Cheeſie) contents; wherefore when ſomething more ſubtil and penetrating, (as is Rennet) paſſes through the Liquor, it eaſily thruſts forth the more thick Particles, with which the pores were poſſeſſed; which then mutually Embrace one another, and are ſeparated apart from the thin, and Wheyie Liquor. When Milk is kept long to a ſourneſs, it is Precipitated after the ſame manner, without Rennet, by warming it over the fire. For in ſtale Milk its Saline parts get a Flux, then being ſtirred up by the fire, ſupply by their own ſourneſs the turn of Rennet; yea, it is not improbable, that the fluid Salt in the Rennet provokes the Saline Particles of the Milk, into a Flux, and that for this reaſon chiefly its Coagulation ſucceeds: for that the Saline parts having gotten of their own accord a Flux, ſo bind the pores of the Liquor, that the more thick Contents are willingly exterminated from them: wherefore we do ſay, for that reaſon, the ſame thing happens, when a Flux of the ſame Salt is cauſed by ſome thing elſe put into it. But that the Coagulation of Milk happens, not only by reaſon of the paſſages and pores being poſſeſſed by a ſtrange Body, the ſign is; becauſe the Salt of Tartar, tho' exceeding Precipitatory, effects nothing of this, and this effect is excited almoſt only by four things. Sugar hinders the Precipitation of Milk, and many other Liquors, becauſe it reſtrains the Flux of the Acetous Salt, and as it is eaſily ſoluble, and its Particles are ſoft and blunt, they extrude not the former Contents implanted in the Liquor, but fill all vacuities, that afterwards there is no ſpace whereby another Precipitating Liquor may unfold it ſelf, and break into anothers quarters.

But Country People are wont to make Butter of the Flowers or Cream of Milk, kept for the moſt part to a ſourneſs, only by ſhaking or Churning it. The reaſon of which (as it ſeems to me) is this: In Cream there is great plenty of Sulphur, with which alſo a mean portion of Salt and Earth is mixed, as may be conjectured, both by the ſourneſs of the Liquor remaining of the Butter, or the Butter-Milk, and by its thicker conſiſtency. In this mixture, the parts both Saline and Sulphureous are in motion, and a flux: but as the Liquor is thicker they cannot preſently fly away: wherefore it remains, that if the bond of the mixture be further looſned, they will ſeparate into parts, and that firſt the ſulphureous Particles, which exceed the others in power, are congregated together with a mutual embrace; wherefore theſe two things, the Churning of the Cream performs, *viz.* it brings the ſulphureous parts by their often obvolution together, whereby they do the better intangle themſelves, and mutually enſnare one another; beſides, it breaks their mixture with the reſt. For this reaſon, in the Winter time, (when Cream is thinner, and abounds leſs with Sulphur) Butter is hardly made. Beſides, the admixtion of Salt or Sugar wholly hinders its making; becauſe by the coming between of thoſe little Bodies, the Sulphureous parts are hindred, from a mutual adheſion.

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The chief Precipitation of the Blood, which is performed within a living Body, is made in the Reins; where, not without the ſtrength of a certain Coagulum, or Rennet, the ſerous matter is ſeparated from the reſt of the Blood; juſt as Whey from Milk: For which reaſon Diuretical things are of the ſame nature, as thoſe which bring a Coagulation to Milk; and therefore, becauſe they more Precipitate the Blood by fuſing it, they cauſe a large profuſion of Urin. The Blood being ſent forth of the Veſſels, ſeparates into various ſubſtances, by its own diſpoſition: whilſt it is warm, it is variouſly Precipitated, by ſome Liquors poured to it, (in like manner Urin) not without a pleaſant ſpectacle. If you pour upon warm Blood the Spirit of Wine, Harts Horn, Soot, Vitriol, or other Liquors, chiefly Spirituous or Saline, a wonderful Ebullition, and heat is ſtirred up; whence we may conjecture, after what manner is grows turgid, in Feavers. But before the reſt, the Salt of Tartar, and a Solution of Alum, procure both in Blood and in Urin, a great perturbation of the Liquor, and falling down of the parts: for theſe diſturb all the Contents in the pores and paſſages of the Liquor, and by their aſtriction, very much lock them up for a long time.

Precipitation in Artificial things is of greater note and uſe: for this for the moſt part follows Diſſolutions, and ſucceeds them as it were by a certain right of Order; becauſe this takes out of their Jaws, and, as it were, lays by the prey, which all *Menſtrua* take by diſſolving. According to the diverſity of the *Menſtruum*, and of the Body diſſolved, Precipitation alſo variouſly happens: but in ſome Subjects there are two chief remarkable things, concerning the manner of Precipitation; to wit, the ſoluted Particles, immerſed in the pores and paſſages of the *Menſtruum*, are wont to fall out of them; either by reaſon of the narrowneſs of the containing ſpace, or elſe by reaſon of the Contents being increaſed in weight and bigneſs: for in ſome the pores of the Solvent, being either leiſurely bound up, or beſet with a ſtrange Body, ſhut forth from their Cells, the little Bodies of the thing ſoluted, and ſend them to the bottom; as may be obſerved in Sulphureous Solutions, or ſuch as are made of the whole mixture of integral parts, in a thin Liquor; which are diſturbed, and lay away their Contents by external cold, ſimple water, or at leaſt by any Acid infuſion. After this manner, reſinous Tinctures, alſo of Sulphur, Olibanum, Benzoin, and the Infuſions and Decoctions of Vegetables, alſo Urin, Milk, and Blood, are wont to be Precipitated: but in ſeveral others, beſides that the pores, and paſſages of the *Menſtruum*, are either leiſurely drawn together, or poſſeſſed by a new gueſt, alſo ſomething new grows to the Particles of the thing ſoluted from the Precipitating matter, whereby being increaſed in weight and bulk, they can be no longer ſuſtained; but that they are neceſſitated to ſink to the bottom. This is chiefly ſeen in the Saline Solutions of Minerals, which are only Precipitated by the Salts; whoſe Particles preſently cleave to the little Bodies of the thing ſoluted, and increaſe their ſubſtance, that preſently they deſcend to the bottom by their own weight: For in Saline Solutions, the little Bodies of the thing ſoluted, are ſtrictly bound together by the fluid *Menſtruum*, with the Saline Particles; and the Particles run haſtily and are heaped together into the Embraces of the ſame fluid Salt, from the Precipitating infuſion of the fixed Salt: wherefore, when theſe three, (to wit, the little Bodies of either Salt, and of the ſoluted matter) do cohere together, they conſtitute greater grains than can be contained in the narrow ſpaces of the *Menſtruum*, and therefore being thruſt out, they fall down towards the bottom: That this does truly happen after this manner, the great affinity, both of the fluid and fixed Salt, is a ſign; that the Particles of both being placed near, or mixed together, are preſently combined in one: alſo, becauſe many Solutions of Minerals, are preſently Precipitated by a fixed Salt, but not by Vitriol or Alum being put in, which do much more bind, and ſtop up the pores of the Liquor. Thirdly, It appears clearly even to ſenſe, becauſe that the matter put for a Precipitate, far exceeds the thing ſoluted in bulk and weight, and is impregnated by the fixed Salt adhering to it. But theſe being thus diſpoſed, we will deſcend to the particular caſes of Percipitations, foraſmuch as Precipitation is made manifold; to wit, according to the diverſity of the *Menſtruum*, of the ſoluted matter, and the Precipitating infuſion.

Simple Water, though it do not well ſuſtain the Particles of the mixture which it receives into it ſelf by Infuſion, or Coheſion, yet hardly ſends them away by Precipitation. For the pores of this *Menſtruum* are too open and looſe, wherefore the Precipitating matter, doth not eaſily ſtrike the little Bodies of the thing ſoluted: in the mean time, by reaſon of the more looſe frame of the *Menſtruum*, ſome parts of the ſoluted Body ſink down; others of their own accord evaporate, from whence that Liquor doth not long keep the Vertues or Tincture, with which they are impregnated by another. As ſome more thick parts and Terreſtrial may be thruſt down to the bottom, or otherways ſeparated, we put in the Juice of Limons, or ſome acid thing, or boil in it the whites of Eggs, to wit, that whatſoever is thick might cleave to their viſcous ſubſtance.

Spirituous and Sulphureous *Menſtrua*, being impregnated with the Sulphureous Particles of the thing ſoluted, eaſily lay by their burden; for they are Precipitated by common, or any

diſtilled

diſtilled Water; as is ſeen in Sulphureous and Reſinous Tinctures of Sulphur, Scammony, Benzoin, Frankincenſe, and others of that kind, prepared by the Spirit of Wine, or Oyl of Turpentine, which preſently grow Milky, by Water or Phlegm being infuſed. For in theſe ſort of Solutions, the pores are wholly poſſeſſed, that they admit nothing beſides the thing ſoluted; and beſides, both the Liquor, and ſoluted Matter are ſo thin, that they eaſily give place to any thing elſe being infuſed.

When *Menſtrua's* of this kind are filled with Saline Particles, as we may obſerve in the Tinctures of the Salt of Corals, of Tartar, and ſuch, Precipitation does not preſently ſucceed from Common Water, but from an Acid Liquor, as the Spirit of Vitriol, Salt, *&c.*

Saline *Menſtrua's* impregnated by the Solutions of Stones or Metals, are moſt eaſily Precipitated by Saline Particles, and ſcarce by others. The chief Precipitatory Liquor, is the Salt of Tartar, or of Herbs burnt to Aſhes, deliquated or melted; for this ſtrikes back the Particles of every ſoluted thing whatſoever, and ſends them headlong to the bottom; to wit, foraſmuch, as it paſſes through every where, the little ſpaces of the ſolvent, and ſticking to the Contents, increaſes them in bulk, that they more eaſily fall out of the pores of the *Menſtruum*, bound alſo together with their own weight.

What fluid Salt (as Vinegar, Stygian Waters, *&c.*) diſſolves, the ſame a fixed Salt precipitates; and on the contrary: becauſe Salt of Tartar being melted, moſt excellently penetrates common Sulphur, and receives the Tincture; which then is precipitated by a fluid Salt, *viz.* by the Spirit of Vitriol, and the like: which indeed does not happen, by reaſon of the diſagreeing Particles of the Salts, and mutually oppoſing one another; but for that the ſame are greatly of kin, and ruſh into mutual Embraces: for from hence, the little grains of the thing ſoluted, by reaſon of the cohering of both the Salts together, being increaſed in bulk and weight, are more readily thruſt out of the little ſpaces of the *Menſtruum*, and deſcend to the bottom. We will in this place, more ſparingly inſiſt upon inſtances of this nature, becauſe the more full handling of them belongs to the Chymical Work.

Precipitation is not only obſerved in the ſeparation of a more thick matter, from a ſerous *latex*, and in the ſetling of the diſturbed parts towards the bottom; but ſometimes the Particles ſhut up within the pores and paſſages of the Liquor, are ſo ſmall and ſubtil, that being Precipitated, they are not diſcerned by the ſight, neither do they quickly deſcend to the bottom; but from their ſituation and poſition, being variouſly changed, the colour, and conſiſtency of the Liquor, are diverſly altered. I was wont in times paſt, to ſport with the Solutions of Vegetables and Minerals, which being made by themſelves, were clear, like Spring Water, and appeared bright, being commixed, ſhewed now a Black colour, now a Milky, Red, Green, Blue, or ſome other kind. The Solution of Saturn, (or Lead) being made with diſtilled Vinegar, appears bright like common Water, if you add to this Oyl of Tartar, like clear Water, the mixture ſtraight grows White, like Milk. If Antimony calcined with Nitre, be boiled in Spring Water, the ſtraining ſeems clear, and almoſt without ſmell, which yet being daſhed by any Acid thing, preſently acquires a deep yellow colour, with a moſt wicked ſtink. Common Water fleing imbued by an infuſion of Mercury ſublimate, is preſently tinged with yellowneſs, by Oyl of Tartar dropped into it. Quickſilver, and *Sal Armoniack*, being beaten together, and ſublimated in a Matrace, by the heat of Sand, go into a white powder; this being ſoluted by melting, ſhows like to clear Spring Water, which yet being ſmeared upon Braſs, or Copper, appears like Silver; and being lightly rubbed on braſen Veſſels, renders them as if they were perfectly ſilvered. A Solution of Calcined Tin, being put to melted Salt of Tartar, becomes bluiſh. A clear infuſion of Galls, being mixt with a ſolution of Vitriol, makes Ink; if you add to this, Spirit of Vitriol, or Stygian Water, the black Liquor is by and by made clear, like Spring Water; and this Oyl of Tartar reduces again to Ink. And what is more wonderful, if you write on Paper with the clear infuſion of Vitriol, and frame any Letters; what you ſo write preſently vaniſhes, nor is there any marks of the Characters left: but if you ſmear over the Paper with an infuſion of Galls, preſently the Letters may be read, if wrote with Ink; which yet, with a Pen run over, dipt in Spirit of Vitriol, you may put quite out at once wetting, and then again render them, with wetting them with another Liquor of Tartar. The Sky-colour Tincture of Violets, being daſhed with Oyl of Vitriol, becomes of a Purple colour: to which, if you add ſome drops of the Spirit of Harts Horn, that Purple colour is changed into Green. *Braſil* Wood, being infuſed in common Water, leaves a very pleaſant Tincture, like to Claret Wine; if you pour to this a little diſtilled Vinegar, the Liquor appears clear, like White Wine: a few drops of Oyl of Tartar reduces it to a deep Purple colour: then if the Spirit of Vitriol be poured in, it becomes of a pale yellow, like to Sack; if you add the Salt of Lead, being ſoluted by deliquation, the mixture grows preſently Milky: by this means you may imitate that famous Water-drinker, who having ſwallowed down a great deal of Spring Water, was wont to vomit forth into Glaces placed before him, diverſly coloured Liquors, reſembling the

the *Idea's* of divers kinds of Wines: for Glaſſes being medicated with the aforeſaid Tinctures, (ſo lightly that they may not be perceived by the ſtanders by) will not only cauſe the Water poured into them, to imitate every Wine, but will exhibit the very *Proteus* himſelf of the Poets, changed into Waters, and from thence putting on all colours, and infinite forms.

If a Reaſon of theſe kind of appearances be asked, it ought to be ſought in the minute Particles, contained within the pores of every Liquor; which as to their ſite and poſition, being diverſly altered, by another Liquor infuſed, tranſmit variouſly the Rays of Light, many ways break or reflect them, and ſo make divers appearances of colours. For when the Rays of Light paſs through almoſt in right Lines, they make a clear colour, like Spring-water; but if in their paſſage, they be a little broken, the Liquor grows yellowiſh; but being more refracted, they cauſe a red colour; if they are bowed back, ſo as to be drained, or that they cannot ſhew themſelves, a dark or black colour ariſes; but if they are again reflected, to the outmoſt Superficies of the Liquor, they create the image of Whiteneſs: after this manner we might variouſly Philoſophiſe about other colours, and their appearances, the diverſity of which, and ſudden alterations in Liquids, depend chiefly on Precipitation: becauſe, as the Particles contained in the Liquor, are driven ſometimes more near by another infuſion that they claſp themſelves together; ſometimes are ordered into other ſeries of poſitions, the diverſe repreſentation of colours is made. For Liquor being impregnated with little Bodies or Atoms, or this Nature, moſt minutely broken, ſeems as an Army of Soldiers placed in their Ranks, who now draw into cloſe Order, now open their Files and Ranks, now turn to the left, now to the right hand, as is diverſly ſhown in the exerciſing of Tacticks, or the Art Military. When two clear Liquors being mixed together ſhall make Ink, it is becauſe the Particles contained in either, approach near one another, and as it were placed in their cloſe Orders hinder the paſſage of the beams of light: when afterwards, this Ink is made clear by another Liquor poured in, it is becauſe the new Bodies of the thing put in, diſperſe abroad the former cloſe joyned Particles, and drive them as it were into their open Orders.

Chap. XII.

Of the Motion of Fermentation, as much as it is to be obſerved in the Coagulation, and the Congelation of Bodies.

Coagulation and Congelation of Natural Bodies, no leſs than their Solution, depend only on theſe our Principles. The improportionate mixture of theſe, and the exaltation, and powerfulneſs of ſome above others, are the cauſe of either. Spirit and Sulphur being looſned from the bond, do not only pull aſunder the proper Subjects, but they ſet upon whatever is next them; and where they are mighty in number and ſtrength, they affect nothing more than divorces and ſeparations from the reſt of the Principles, and ſuffer no delay: but on the contrary, Salts love to be united to the reſt, and to be made into hard and ſolid ſubſtances; and being deſtitute of the Company of the reſt, preſently to enter into new Friendſhips, and deſire only not to be joyned to any oppoſite. If at any time they are more impetuouſly moved, either by their own diſpoſition, or being ſoluted, they deſtroy the ſubſtance of others, this thing ſeems to be done for this end, deſtinated as it were by Nature, that they might find out ſubjects agreeable to themſelves, and having through War obtained Peace, they might at length be more ſtrictly united unto them: wherefore when ſaline *Menſtruums* corrode Stones or Metals, they are Coagulated with their Particles, and grow together into diverſly figured Cryſtals.

When we here treat of Coagulation, we do not take this word after the uſual manner: to wit, as it is wont to be vulgarly uſurped, when Milk is become congealed, that is, departs from its ſimple and equal Liquor, into Heterogeneous ſubſtances, *viz.* Cheeſe, or Curds and Whey, or thick and then; in like manner, when Blood or other Humors go into parts after that manner, they are ſaid to be coagulated: alſo, we have elſewhere given this ſenſe, to this word, tho' to ſpeak properly, theſe ſort of motions ought rather to be referred to Precipitation than to Coagulation. But here we would have to be underſtood, by the term Coagulation, an alteration in Bodies of the ſame kind, as when things at firſt tender and ſoft, grow hard, into a ſtiff, and as it were ſtony matter: or any thing is ſaid to coagulate, when ſaline little Bodies being diſperſed abroad in any ſubject, begin to be congregated and joyned

together, and from thence united, either among themſelves, or with Earth, produce out of a ſoft and fluid ſubſtance, a hard and compacted. This may be perceived in the ſhells clearly ſtony, of Fruits and Seed; in Bones and Horns of living Creatures, in ſhells and ſhelly ſcurfs of Fiſhes; all which indeed very much abound with an Alcali Salt, or the ſame Volatilized. Among Handicrafts, or Preparations from Human Induſtry, the Cryſtaliſation, Vitrification of Salts, or making of Glaſs, alſo the baking of Pots and Earthen Ware, ought to be referred to Coagulation.

But it is properly called Congelation, when the Saline Particles, coming from elſewhere, ſtrictly bind together the ſubjects on which they fall, fix the Particles variouſly moved within the ſubſtance of the mixture, and gather them together, that by that means the whole becomes ſtiff, and as it were ſtony. We may behold theſe kind of effects in Ice and Froſt, by which ſoft Mud, or fluid Springs of Waters grow ſtiff, into a very Marble ſubſtance. Alſo the ſame is manifeſtly beheld, among the Operations of Art, in the confuſions of ſome Salts, and mutual Concretion in Sublimating; by which means, they go into a ſubſtance, now like to Ice, now to Snow. To which may be added the Artificial turning of Water to Ice, which is performed by the mixture of Salt and Snow; but the inſtances which we have remarked in either of theſe, about the Works of Art, we will in this place briefly run through, and a little conſider the reaſons of them, and the ways of being done.

The Cryſtaliſation of Salts, is procured after this manner; Salts of every kind are throughly diſſolved in common Water, and their Particles being diſperſed through the whole Maſs of the Liquor, wholly diſappear; afterwards, if this Liquor be ſomewhat evaporated, that its paſſages and pores be ſomething bound together, the little Bodies of the Salt cloſe one with another, and mutually take hold of themſelves, and joyn together, the outward cold binding them, and are figured in the midſt of the Water, into Cryſtals proper to their Nature. By this means *Sal* Nitre into Pyramids, Sea Salt into Cubes, Alum into eight cornered Figures, *Sal* Armoniack into ſix cornered, and other Salts are formed into other Figures of their own accord, after a conſtant manner.

If the Reaſon of this be ſought after, we ſay that theſe kind of Salts are not ſimple Elements, but Bodies made up of abundance of Salt, with the other Elements mixed with them in ſmall quantity; which even as other Natural Concretes, are allotted by the firſt Creator, peculiar manners of figurations, according to the ſurpaſſing ſtrength of Salt and Spirit, and commixion with the reſt. For in determining the Figures of Natural Bodies, Spirit and Salt are as the Rule and Compaſs in deſcribing Mathematical Figures: Spirit, as the moveable Foot of the Compaſs, or as a Penſil in the hand of an Artiſt, variouſly excurs and draws here and there diverſe faſhioned lineaments. But Salt (as the applyed Rule) moderates the excurſions of the other, and determinates them, and reſtrains them within the confines deſigned by Nature: when the Spirit is more powerful than the Salt, there happens a greater variety in the Figuration of things, as in Vegetables and Animals; becauſe the Spirit running forth more largely, forms very many Marks of its Pourtracture, and deſcribes Bodies not in right Lines, but intorted, and very much variegated. Where the Salt lords it over the Spirit, as in Mineral Concretes, and chiefly ſaline; Bodies grow together in leſs adorned Figures, and are accounted the firſt and more ſimple, and of that ſort, as the Mathematical deſcriptions in right Lines or Circles. For thoſe Salts, are as it were ſecond Elements; and from the implanting of them in Bodies, the proper and native Figures of things, very much depend; and therefore they themſelves are primitively imbued by Nature with a certain Elementary Configuration, (ſo that according to *Plato*, God in truth exerciſes Geometry) and the firſt regular Figures are formed in the more ſimple, that things compounded of them, might ariſe furniſhed with all manner of variety of figures.

The fixed Salts of Herbs being prepared by Calcination, becauſe they are almoſt deſtitute of the Fellowſhip of Spirits, do ſcarce go at all into Cryſtals, nor are they coagulated, but by a long evaporation. Sea Salt containing a very little Spirit, with great Labour goes into Cubes. Next to this Alum, gifted with a little more Spirit, is more eaſily coagulated, and grows into more elaborate Figures, *viz.* eight cornered. *Sal* Nitre, ſwelling with ſpirit, is moſt eaſily coagulated, and is framed into a more perfect Figure, *viz.* Pyramidical; which conſiſts of both ſpherical, and right Lines. But Volatile Salt, (ſuch as is diſtilled out of Urine, Blood, and the Horns of living Creatures) being aſſociated with a plentiful Spirit, is drawn into Concretes, very much varying, which imitate now the Horns of Staggs, now the Figures of Plants. Out of Mercury, with Salt, or the Calx of Silver, by an Amalgama, in the midſt of the waters a Silver Tree is formed, with Stock, Trunk and Branches, painted to the Life. It is a uſual thing in the Winter-time, for the Air, impregnated with ſaline Vapors, and fallen on the Glaſs Windows, to be condenſed into moſt fair Figures of Trees and Woods. So much for the Cryſtalliſation of Salts: The other Species of Coagulation, is Vitrification, of which we will ſpeak next.

Vitrification

Vitrification (which is alſo ſaid to be the laſt mutation of Bodies, of which Nature is capable, and from which there is no going back) depends upon a fuſed Salt, and united to an Earthy Matter, even to its ſmalleſt Particle: for when either Matter is fuſed, by a moſt vehement fire, and divided in its ſmalleſt parts, the Bodies of either, being put into a Flux, are by ſo ſtrict a marriage joyned together, that afterwards they are never to be pulled aſunder.

There are many ways, and diverſe proviſions of Vitrification; to wit, of *Sal Alcali*, with Sand or a ſandy matter fuſed together by a violent Fire, common Glaſs is made; which is tranſparent, both by reaſon of the abundance of Salt, and of the clearneſs of the Sand; for if you behold the little Sands of which Glaſs is made, with a Microſcope, each of their little Globes appear, (as they were Glaſſie Gems) clear and ſhining. Wherefore Salt promotes the fuſion of that clear matter by fire, and then is admitted into its moſt ſtrict embraces being fuſed.

Beſides Glaſſes of diverſe Colours and Conſiſtences are made of Minium, the Calx of Tinn, Antimony, and ſome other Minerals, (when the ſulphureous part doth firſt fly away) fuſed, now by themſelves, now with Flint or Sandy matter. The reaſon of all which conſiſts in this; that Salt and Earth, being moſt ſmally broken by a violent fuſion of fire, and being divided as to their laſt Particles, catch hold of one another, and ſo are bound together, by the moſt ſtrict bond of the mixture. The Coalition or Coupling of theſe, is never to be diſſolved, becauſe there is wanting within in the mixture, other Principles, which might unlock the frame of the ſubject: yea, Salt and Earth, being joyned by the mediating fire, do ſo intimately cohere, that they affect not divorces of themſelves, nor ſuffer them from another.

The baking of Earthen Pots and Bricks, is of kin to Vitrification (or making of Glaſs) whereby moiſt and ſoft Clay is ſtifned into a very ſtony hardneſs: But in theſe, there is greater plenty of Earth, and leſs of Salt; wherefore they are leſs brittle, and not tranſparent. Concerning theſe we ſay, that by the fire mediating, and as it were handying the ſmalleſt, broken, and divided Particles of Salt, are married to every Particle of the Earthy matter, and with them grow hard, into as it were a ſtony ſubſtance, and that not eaſily to be reſolved. Alſo in theſe kind of matters, prepared by human Induſtry, we imitate indeed, with an excellent Artifice, the Concretions of Bones and Stones, made by Nature in divers Families of Animals, Vegetables, and Minerals.

As to what reſpects Congelation; Salts of a diverſe kind, do often meet together, and grow ſtiff, into as it were a new ſubſtance: But this happens many ways. Of theſe, ſome Salts being mixed together, preſently grow together into Cryſtals: for the Acid Spirits of Minerals being added to the Salts of Tartar, or thoſe made of the incineration of Vegetables, turn into a white Coagulum, like Snow, and with a ſpumeous or frothy Heat: The reaſon of which is, that the Particles of the Salt, having gotten a Flux, take hold of other Salts in the Spirit, Alcaliſate by melting; but by reaſon of the firſt Particles of either, being made unlike, there ariſes a ſtrife; then from the ſame conſociate in one, that white ſettlement is made.

Not unlike the ſame manner, theſe Acetous Spirits, to wit, of Vitriol, Nitre, Salt, and others being mixed with Metals, while they corrode them, are Cryſtalliſed together with their ſaline Particles: ſo the Spirits of Vitriol, Nitre, alſo Stygian Waters, (which are only Salts having gotten a Flux) are formed into moſt elegant Cryſtals, in the diſſolving of Silver, Iron, Copper, and other things. For Salts, even as Sulphur, being looſned from the mixture, diſſolve other mixtures, and greedily deſire to be united with the Homogeneous Particles of the ſame ſubject.

There is another manner of Congelation, when Salts being mixed with ſome other matter, are elevated by ſublimation out of their ſubjects, and then congeal the Particles of that new matter, which they carry away with them, and grow together with them (like a Meteor) on high: after this manner the Salts of Vitriol, Nitre, and Sea Salt, being ſublimated with Mercury, are congealed as it were into a ſnowy ſubſtance: The ſame being ſublimed with Antimony, go into a matter like Ice. After this manner the Natural Congelations, by which ſome Minerals, and chiefly Vitriols and Sulphurs, are begot in the Bowels of the Earth, may be imitated. For of Iron and Copper are prepared factitious Vitriols, which are very like the Natural: Of Antimony Sulphur is made, which anſwers to an hair our common Sulphur in taking fire, colour and ſmell: For example, Pour Oyl of Vitriol, to the height of a finger's breadth, upon pulveriſed Antimony; and let it be diſtilled in a Retort in a Sand Furnace, a yellow Sulphur will be ſublimed in the Neck of the Retort, that cannot be diſcerned from the common Sulphur: which is a ſign that the Concretion of Sulphur is made in the Earth, when ſome ſulphureous Mineral is corroded by the Salt of Vitriol, whoſe ſulphureous parts are congealed by the ſame Salt. This alſo is an Argument, that Oyl of Sulphur, which is ſeparated, by inkindling under a Bell from the ſulphureous matter, is nothing elſe but Vitriolic Salt, nor doth any thing differ from Oyl of Vitriol.

Artificial Congelation concludes Inſtances and Examples of Congelations: to wit, whereby common Water, or any Liquors being put over the fire, or in an Hot Houſe, are ſuddenly congealed into Ice: 'tis a common way, and vulgarly known. Salt being mixed with Snow and Ice, and agitated or ſhaken in a Veſſel put into Water, ſuddenly the Water about the ſides of the Veſſel will be frozen. This will be done, if you make tryal of it, either with common Salt, or Sea-Salt, Nitre, or alſo with Vitriol, Alum, *Sal Armoniac*, or Mercury ſublimate: For Salt of every kind, being put to Snow or Ice, looſens their mixtures, and ſends away the Nitrous and Congelative Particles from the ſubjects; which preſently being immerſed in the neighbouring Water, congeal it, as if they were freſhly blown from the North.

What is more admirable; let a Diſh with Snow be placed over hot Coals, and in the middle of the Snow put a Glaſs full of Water: as the Snow is melted by degrees by the fire, the Water ſhall be frozen: for the Nitrous Particles, being driven away by the heat, by their departure, they are daſhed againſt the neighbouriug Water, and congeal it.

And thus much for FERMENTATION in general, and briefly of its various parts; it had been almoſt an infinite Labour, and from our purpoſe, to heap up Inſtances in ſo diffuſe a thing. Thoſe hitherto brought, however choſen out of Natural Philoſophy, were fit to wait upon the following Medical Diſſertation, that we may more happily know the Original, Progreſs, and State, as alſo the Remedies and Cure of Motions, and Mutations, in Cauſes, which variouſly happen to all kind of Bodies, and ſomewhat reſpecting the Tumults, which from thence are begot in the human Body, from the Blood being irritated, and the reſt of the humors; to which exerciſe, God willing, we will now proceed.

F I N I S.

THE PREFACE TO THE Treatiſe of Feavers.

To the Friendly Reader,

TO *Inſtitute in this Age a new Doctrine of Feavers, may perhaps ſeem the ſame thing, as if any one ſhould go about to deſcribe the midſt of our Country, for a Land before unknown. For what reſpect the* Diagnoſis *of this Diſeaſe, ſeem to be firmly Eſtabliſhed already, by the Precepts and Practice of the Antients and Moderns; yea, by long Experience, they are ſo generally in the mouth, and known of all Men, that nothing can be more. However I deſerve pardon, if I a little receed from the Vulgar Opinion concerning Feavers, as a way mightily worn out; and go on in a leſs trodden Path; becauſe I am not the firſt, or only Man that directs his courſe againſt the received Opinion, as againſt a Stream. For in truth, in the Medical Art, (and that deſervedly) thoſe things have not pleaſed the Men of our Age, which did thoſe of the former: becauſe the Antients relying on a falſe Poſition concerning the Motion of the Blood, proceeding as it were through ſlippery and moiſt places, often fell foully and dangerouſly: wherefore it is no wonder, if thoſe who come after ſhould take care for the thorough Inſtauration of Phyſick, and for the Re-Edifying the Building, (as they ſay) even from the Ground, the Antient Props being fallen down, on that which our moſt Famous* Harvy *hath laid, the Circulation of the Blood, as a New Foundation in Medicine. But in this Work, Learned Men of other Countrys, but chiefly of our own, have happily laboured, not only in removing the Rubbiſh of the former Building, but for the ſupplying this plenfully with Stone, Planks, and other Matter. In times paſt, among the Antients, as the Diſtribution and Natural Motion, of the Nutritious Humor, of the Blood and Nervous Juice; ſo the Feaveriſh Heats, and Preternatural Motions of them, were wholly hidden and lay in the dark: but now new Lights have ſhined forth, and it is granted us to know the Cauſes of things before hidden, it doth not become prudent Men, and profeſſing Philoſophy, even to ſhut their Eyes and remain blind in the Light it ſelf; but eſpecially about a Diſeaſe by which the third part of Mortals have ſtill fallen to this day, to be rather willing to Err with the Antients, than to underſtand the Truth with the Moderns, or to believe what is more likely, argues a mind guilty of notable ſtubbornneſs. When therefore the Puretology or Feaver Tracts of former Medicine, had no firm and ſtable Baſis, and that it is eaſie to ſhew that it was built upon very many, and plainly falſe Errors, what ſhould hinder, but that we having gotten more certain Principles, ſhould endeavour to erect a better Science coucerning Feavers? Truly I think it would hardly be, altho' the Pleas of the Antients, ſhould be yet openly maintained in the Schools, but that many Phyſicians, who have a mind to look within the Bark, would frame new Hypotheſes to themſelves from their own Ratiocination, by which they might more exactly quadrate the Phænomena of Feavers, than by that of the Antients. But it may be objected, that Feavers have been happily Cured by the ſame Remedies, and the like Method of Curing, from the times of* Hippocrates *and* Galen, *even to our days; and therefore it may ſeem a raſh Work, and little ſafe, that we ſhould endeavour new things, after having had the Experience of ſo many Ages, eſpecially ſince it is about the Human Body.*

Body. To this it will be easie to answer, that Medicine was at first Empirical, and Remedies were not invented by general Precepts, or by Rule, but by the frequent trial of several things: And if led by the Example of Hippocrates, *his Followers had only polished his Observations and Experiments, without doubt the Medicinal Art had grown up better, more handsomly, and with greater benefit to the Sick. But that the Light, clearly inkindled by the Antients, did so suddenly shut up, and darkned the Eyes of Posterity, it was, the preposterous study of those, who too hastily framed, almost out of their own Brain, Physick into a general Method, after the manner of some Speculative Science: for by this means, before they had laid a firm Foundation, a sufficiently specious, and deceitful Pile of unstable Doctrin, was erected. That therefore in the Cure of Feavers, some Indications being more antiently received, remain yet confirmed, and are to be perpetually observed, is to be ascribed wholly to Experience, the first Mistress of this Art, and not to the Precepts of Scholars. And from hence, I hope for my self, to have gotten a defence sufficient enough; for if the Opinions wholly erroneous of the Antients, had not hindered, but that the Practice of Medicine, at first instituted by a certain induction of observations, had proceeded commodiously enough; the Theory being joyned with Truth, would have brought much less hurt to the Sick; or have less carried away those exercising Medicine, quite contrary from that Path, which Antiquity had left commended to us. In the mean time, 'tis not to be dissembled, that naked Experience, without the helps of Method and Reason, avails little, yea very often doth much hurt; for neither are the same Diseases, every where to be driven away by the same Remedies. But he seems to have hit the mark, who joyns both together, that Reason may not pervert Experiments, and Nature it self, not that this may remove Reason from its place. Altho' that I know well enough, I have not obtained it, yet I will freely profess, that I have aimed at this Mark; and perhaps I may have deserved some praise, even in failing in these sort of Adventures; for after I had not found in Books, what might satisfie a mind desirous of Truth, I resolved with my self, to search into living and breathing Examples: and therefore sitting oftentimes by the Sick, I was wont carefully to search out their Cases, to weigh all the Symptoms, and to put them, with exact Diaries of the Diseases, into Writing; then diligently to meditate on these, and to compare some with others; and then began to adapt general Notions from particular Events: and when by this means, for a long time, observing the Accidents and Courses of Feavers, I had busied my self, for the finding out forms of Reasons for their Cure, at length a new Pathology of this Disease was conceived in my mind; which afterwards, by the frequent increasing Concourse of Observations, as it were the Juice and Blood, was formed by degrees into a Child, such as it now appears. But the Infant, which I had ordered to be kept closely, in our private house, being remarkable for Paradoxes, as it were a monstrous shape, the importune diligence of Friends has taken care to bring abroad, being gotten forth of my hands, and to be publickly beheld. What therefore is there said concerning Feavers, besides the common manner, I would not have any one esteem it brought forth by me, as from a Doctor in the Chair: doubting, I bring these thoughts into Publick, and submit them to the Examination and Emendation of the more Learned. That others before me have not spoken all things truly concerning this thing, shall be an Argument that I may Err, yea (if you please) that I have Erred: however, if I should have rightly traced forth any marks, in this, at least new search of Truth; and shall have incited others (who are far better able) by this occasion, to the full finishing of it; it will not repent me altogether of this, tho' rash beginning.*

OF

OF FEAVERS.

CHAP. I.

The Anatomy of the Blood; and its Resolution into five Principles: A comparing it with Wine and Milk.

THE Doctrine of Fermentation being explicated, it remains that we handle the chief Instance or Example of it, to wit, *Feavers*. For it seems that a Feaver is only a Fermentation, or immoderate Heat, brought into the Blood and Humors. Its Name is derived from *Februo* (or *Purgament*, which also is derived from *Ferveo*, to be Hot) which Word indeed is commodiously put to every *Feaver*; for that the Blood in this Disease grows hot; and besides, by its fervor, as working must, it is purged from its filthinesses. But that this Fermentation or feaverish Effervency may be rightly explicated, these three things are to be considered. First, What the fermenting Liquor is; whether only Blood, or any humors besides. Secondly, In what Principles in the mixture, and in what proportion of them this Liquor consists. Thirdly, and lastly, By what motion and turgescency of those Parts or Particles, of which the Blood is made, the Feaverish Effervescency is stirred up. These being thus premised, the Doctrine of Feavers shall be delivered, not from the Opinions of others, but according to the comparisons of Reasons, picked (though from ours, yet) from diligent and frequent Observation, and confirmed by certain Experiments; all which however, I willingly submit to the Judgment of the more skilful.

It plainly appears, even to the Sense, that the Blood doth hugely boil up, and rage in a Feaver; for every one (though rude and unskilful) being in a Feaver, complains of the Blood being distempered, and of the same growing hot in the Vessels, and as it were, put into a fury. Also, besides the Blood raging in the Veins and Arteries, it may be lawfully suspected, that that Juice with which the Brain and Nervous Parts are watered, is wont oftentimes to be in fault; for when this Liquor is seen to be carried back from the Blood, into the nervous stock by a constant motion, and certain Circulation, and from thence through the Lymphatick Vessels, into the bosom of the Blood, it is probable, if by reason of a Taint contracted from the Blood, that humor be depraved in its disposition, or is perverted from its equal motion, that from thence the Rigour, and Pain, Convulsion, Delirium, Phrensie, and many more Symptoms of the Nervous kind, usual in Feavers do arise.

After the Blood and Nervous Liquor, two other Humors, for that being apt to grow hot, fall into our consideration, *viz.* The Chyme or nourishing Juice, continually coming to the Mass of Blood, and the serous Latex, perpetually departing from the same, which, though they be the first and last Liquors separated from the Blood, and distinct from it, yet being confused with it, they ought to be esteemed as its associate parts or complements; for the nourishable Juice being fresh brought, is accounted the crude part of the Bloud, and to be assimilated; and the *Serum*, it's stale part, and to be carried away. And after this manner, so long as either are circulated with the Bloud it self, in the Vessels they participate of the heats of the first begotten Bloud, and oftentimes occasionally begin them, or increase them being begun; but by what means these things come to be be done, is declared hereafter in their proper places. As to the rest of Humors, which are only the Recrements of the nutricious Juice, or the bloud, when they are included, either in their proper Receptacles, or constrained in the narrow spaces in the *Viscera*, neither wash the several parts of the Body with a continual lustration, as the Bloud or Nervous Liquor, or the other Humors but now recited, are to be exempted from this Rank; sometimes perhaps they may be the occasional Cause that the Bloud doth conceive an undue Effervency, or that it persists in it longer; but it is only the Bloud, (with the the Nervous Liquor, the alible Juice, and *Serum*, Associates) which

which boiling up above measure, with its heat, and stirred up with a rage through the Vessels, diffuses the preternatural heat, and induces the formal reason of the Feaver: but how this comes to be done, is not to be known plainly, but by a more near beholding the Nature of Blood, and as it were an Anatomy made of its Liquor.

There are in the Blood, (as in all Fermentative Liquors) Heterogeneous Particles, which as they are of a diverse Figure and Energy, remain a long while in the mixture, by their mutual opposing one another and subaction, the motion of Fermentation is continually conserved; as is perceived in Wine, Beer, and other Liquors: then, if the mixtion of the Liquor be somewhat unlocked by the adding of Ferments, the Native Particles being freed from their bonds, do yet more swell up, and induce Fermentation, with a more rapid motion and heat: which is seen in a familiar Experiment of the Chymists, *viz.* when fluid Salts are mixed with saline Liquors of another kind; from thence a great heat and ebullition are stirred up. Wherefore we ought to inquire concerning the Blood, of what Particles it consists, that it should be fit to Ferment, (as Wine, Beer, and other Liquors) of its own Nature: then by the help of what kind of Ferments, both its Natural and Feaverish heats are performed, with warmth, and a more quick motion.

The Mass of the Blood, by the Opinion of the Antients, was thought to consist of four Humors; to wit, Blood, Phlegm, Choler, and Melancholy: and it was affirmed, that according to the eminency of this, or that Humor, diverse temperaments are formed; and that by reason of their fervors or exorbitances, almost all Diseases do arise. This Opinion, tho' it flourished from the time of *Galen*, in the Schools of Physicians, yet in our Age, in which the Circular motion of the Blood, and other affections of it were made known, before not understood, it began to be a little suspected; nor to be so generally made use of, for the solving the *Phænomena's* of Diseases: because these sort of humors do not constitute the Blood, but what are so called (except the Blood) are only the recrements of the Blood, which ought continually to be separated from it: For in truth the Blood is an only humor; not one thing about the Viscera, and another in the habit of the Body; nor is it moved at one time by Phlegm, and another time with Choler, or Melancholy, (as is commonly asserted) but the Liquor growing hot in the Vessels, is only Blood, and whersoever it is carried through all the parts of the Body, it is still the same, and like it self. But because by reason of the abundance of the implanted heat in some, and because of the smalness of it in others, the Coction of the Aliment is now quicker, now slower performed in the Bowels, and in the Vessels; therefore the temper of the Blood (tho' but one, and always the same Liquor) becomes diverse: and according to the various disposition of this, it may be said that men are Choleric, Melancholic, or of another temperament. Besides, because whilst the Blood is made in its Circulation in the Vessels, some parts continually grow old, and others are supplied anew, hence from Crudity, or too much Coction, there is a necessity that what is excrementitious should be heaped together: which notwithstanding by its effervescency, (as by the working or depuration of Wines it comes to pass) it is separated from its Mass, *viz.* the watry humor, fixed in the Bowels, or solid parts, is it which is called Phlegm: some Reliques of adust Salt and Sulphur, being separated in the Liver, and received by the Choleduct Vessels are called Choler; the Earthy feculences being laid up in the Spleen, are termed Melancholy. In the mean time, the Blood if rightly purified ought to want Choler, Phlegm and Melancholy: even as when some Wines, or Beer are purified, the more light Particles are carried upwards, which constitute its Flowers or Head; and the dregs are prest down to the bottom, which grow together into Feces or Tartar: yet none can truly say it, Wine or Beer is composed of Froth, Tartar, and a Vinous Liquor. But as these humors, commonly so called, are made out of the other Principles, *viz.* Choler out of Salt and Sulphur, with an admixtion of Spirit and Water; and Melancholy, out of the same, with an addition of Earth; and as the Blood is immediately forged out of these kind of Principles, and is wont to be resolved sensibly into the same, I thought best, the common acception of humors being laid aside, to bring into use these celebrated Principles of the Chymists, for the unfolding the Nature of the Blood and its affections. There are therefore in the Blood, as in all Liquors apt to be Fermented, very much Water and Spirit, a mean of Salt and Sulphur, and a little of Earth. The Blood being loosned by putrefaction, exhibits the same separated and distinct. Also in the Blood contained in the Vessels, or being fresh let out from them, we may discover their energies and effects: besides, when in the Food, whereby we are fed, by the Juice of which the Liquor of the Blood is made, these same are implanted, no man will go about to deny that the Blood also is made from them: wherefore I will briefly run through these, and endeavour to shew by what means the Consistency, the Properties, and the Affections of the Blood are made by them.

1. Spirits (which readily obtain the chief place) are a subtil, and greatly volatile portion of the Blood. Their Particles, always expansed, and endeavouring to fly away do move about the more thick little Bodies of the rest, wherewith they are involved, and continually detain them in the motion of Fermentation. The Liquor of the Blood continually boils up with their effervescency or growing hot, and equal expansion in the Vessels, and the rest of the

the Principles are contained in an orderly motion, and within the bond of the exact mixture; if any Heterogeneous thing, or unagreeable to the mixture, be poured into the bloody Mass, presently the Spirits being disturbed in their motion, rage, shake the blood, and force it to grow hugely hot, until what is extraneous, and not missible, is either subdued, and reduced, or cast out of dores. By the irradiation, or rather the irrigation or watering of these, the Bodies of the Nerves are inflated, the Functions of the Viscera, and also the Offices of motion, and sensation are performed: from the want of Spirits, also from their motion being depraved or hindred, arise great vices of the Natural œconomy or Government. The more quick motion and effervescency of these in the blood, (above what is in Wine) chiefly depends upon the Ferment of the Heart; because, whilst the blood passes through the Bosom of the Heart, its mixture is very much loosned, so that the Spirits, together with the sulphureous Particles, being somewhat loosned, and as it were inkindled into a flame, leap forth, and are much expanded, and from thence they impart by their deflagration, a heat to the whole. By reason of this kind of expansion, and suffusion of heat, there is made a continual expence of Spirits, which being rarified, as it were inkindled, continually fly away, and are evaporated forth adoors: and as long as we live there is made a continual reparation of these by aliments, chiefly the most delicate; which contain in themselves very much of Spirit and swelling matter: from which juice being drawn by digestion, and collated to the blood, is assimilated to it and fills up its defects. When the Blood of Animals is distilled, the Spirits (like *Aqua Vitæ*) ascend of a limpid colour, they are made very sharp and pricking, by the adhesion of the Salt; yet they are not so easily drawn off, as the Spirits of Wine, but that there is need of a more intense fire to force them, because they are hardly driven from the fellowship of the thicker parts, with which they are involved.

2. That there is plenty of Sulphur in the Blood, it is plainly seen, because we are chiefly fed with fat and sulphureous Aliments, also the Nutriment from the blood, carried to the solid parts, goes into Sulphur and Fatness. It is most likely, from the dissolution of this, that the red Tincture of the Blood doth arise: for sulphureous Bodies, before any others, impart to the solvent *Menstruum*, a colour highly full of redness; and when by reason of too great Crudity, the Sulphur is less dissolved, the blood becomes watery and pale, that it will scarce dye a Linnen Ragg red. The Mass of blood being impregnated with Sulphur, and together with Spirits, it becomes very Fermentable: which however, whilst it enters the Ventricles of the Heart, there suffers a greater effervescency, or rather accension; and on the Particles chiefly sulphureous, being inflamed; and thence diffused through the whole, the lively and vital heat in us depends. When the sulphureous part is carried forth, and doth too much luxuriate in the blood, it perverts its disposition from its due state, that therefore the blood being either depraved, or made more bilous or Cholerick, doth not rightly Cook the nourishing Juice; or being inkindled throughout, it conceives heats and ardours, such as arise in a continual Feaver. For the Sulphur being too much exalted; and swelling more than it ought, stirs up great heats in the blood: and they whose blood is more plentifully impregnated with Sulphur, are most obnoxious to Feavers. By reason of the Particles of this being incocted with the Nutritious Juice, and from thence carried to the solid parts, fatness, softness and tenderness, come to our Body. From the Flesh or Blood putrefying, by reason of the abundance of evaporated Sulphur, a most evil stink breaths forth: In the distillation of Blood, Sulphur ascends under the form of a blackish Oyl, which also by reason of the Empyreuma, stinks most wickedly.

3. That Salt is in the Blood, is evinced by the Salt; which, tho' fixed, is drawn forth, by being eaten, from Vegetables, and from other eatable things, at first less volatile, afterwards by the most excellent digestion of Nature, and Circulation, is highly volatilised; that it passes through, not only without a remaining *Caput Mortuum*, all the members and parts of our Body, but also the blood being exposed to distillation, ascends the Alembic, and leaves the dead Head as insipid earth: If at any time the saline Particles are not rightly exalted in the Blood, by reason of ill digestion, but remain crude, and for the most part fixed, from thence the blood becomes thick and unfit for Circulation, so that Obstructions are begot in the Bowels and solid parts, and serous Crudities are every where heaped together: But if the Salt be too much carried forth, and suffers a Flux, the Spirit being depressed, or deficient, a sour and bitter disposition is given to the blood, such as is observed in Scorbutical People, and those sick of a Quartan Feaver. Also from the Salt, for this reason being variously coagulated, the Stone, Kings-Evil, Gout, Leprosie, and very many other Chronical Diseases arise. But when Coction being rightly performed in the Bowels and Vessels, the Salt is duly exalted, and being associated with the Spirit, is volatilised, then by reason of its mixture, the Liquor of the Blood more equally ferments; also is defended from Putrefaction, Stagnation, and Coagulation: Also the saline Particles, bridle the fierceneses of the Spirits, and especially of Sulphur; wherefore, those who have their blood well filled with a Volatile Salt, are less obnoxious to Feavers: also hence those who often are let blood, are more apt to Feavers.

4. Besides, There are in the Blood, (as it is a thick Humour, and hath a gross consistence) many Earthy Particles: from hence also, its too great Volatilisation is as it were supported, and its too hasty accension hindered: even as Charcoal-dust, is added oftentimes to Gun-Powder in a greater proportion, that all its parts may not take fire at once, and too soon. Further, from the Terrestrial Particles of the Blood, and Nutritious Juice, the bulk and increase of the Body proceeds. Lastly, from the distillation of the Blood, a light and friable *Caput Mortuum*, is left in great plenty.

5. Upon the watery part of the Blood depends its fluidness; for from hence its stagnation is hindered, and the Blood is circulated in the Vessels, without growing thick or stiff: also its too great conflagration, and adustion is restrained, and its heat attempered. When Blood is distilled a clear and insipid Water is drawn off, at least in a double proportion to the rest; for from hence the matter of Urin, Sweat, and every humid Excrement, for the most part proceeds.

What things were but now asserted, concerning the Principles of the Blood, and the affections to be deduced thence, will better appear, if we consider a little the Blood, according to its sensible parts, and shall compare it with other Liquors which are in daily use amongst us. Those sort of Liquors, which have a very great Analogy with the Blood, are, *viz.* Rich Wine and Milk. As to the Reasons of Fermentation and growing Hot, it is most fitly compared to Wine; as to its consistency, coagulation, and departure of the parts one from another, it is likened to Milk.

In the first place therefore, it is observed of Wine, that so long as it is shut up in the Vessel or Pipe, its subtil and spirituous Particles, do perpetually agitate, or very much shake others more thick, break them, and render them fit for an exact mixtion; what is heterogeneous, and and unfit for subaction or mingling, is separated by its growing hot: In the mean time the purified Liquor greatly fermenting, is in perpetual motion, whereby all the parts (as Atoms, variously moved up and down, in a beam or streak of light) do stretch themselves forth on every side, and contend with a constant rowling about, from top to bottom, and from thence to the top again. By the attrition and refraction of the Particles, very many *Effluvia* of Atoms, go away from the Liquor, which if the Vessel being closely shut, they are kept within; the Liquor grows too excessively hot, and oftentimes causes the containing Vessel to burst in pieces. Blood, much after the same manner being shut up within the Veins and the Arteries, is urged with a constant Circulation: The Vital Spirit makes subtil, breaks, and exactly molds the more thick Particles; what is heterogeneous, and not mixable, it expels forth of dores; in the mean time by the refraction and kneading of the parts, *Effluvia* of heat do constantly stream forth, and evaporate through the pores; which being shut in, if transpiration be hindred, presently by reason of the too great boiling of the Blood a Feaver is inkindled.

Secondly, We will observe concerning Wines, that they grow turgid, or swell up, if any extraneous thing, and of a Fermentative Nature, be poured to them; yea sometimes, that they are moved more than ordinary of their own accord. For, when by a long digestion, the sulphureous part of the Wine is too much exalted, it conceives a greater heat than it ought, and (unless presently appeased) perverts the disposition of the whole Liquor, with its swelling up. It seems to be for the very like reason, that the Feaverish heat which is wont to be introduced by reason of the same Causes, is stirred up in the Blood, as shall be shown in the next Chapter, where we treat of the Motion and Heat of the Blood.

The third Observation, or comparing of the Blood with Wine, shall be of this sort: Wines (as also many other Liquors, as for example, Beer, or Sider) have their times of crudity, maturation, and defection. For when they are first made, the spirituous parts are so obvolved by the others more thick, that they shew themselves but little, and put forth almost nothing of strength or vertue: and as the other Particles, are not yet subtilised, nor truly concocted, the whole Liquor remains crude, and of an ungrateful taste; and if put to distillation, not any Spirit ascends. From this state it comes by degrees to perfection, and when the Spirits being extricated from their intanglements, obtain their own right, and have subtilized and exalted the more thick Particles of the rest, the whole mass of the Liquor becomes Clear, Spirituous, Sweet, and Balsamick. Lastly, When by a long Fermentation, the Spirits are consumed, and begin at length to fail, the state of defection is induced, whereby Wines, and other Liquors, either pass into a tastlesness, or at last the Salt and the Sulphur being too much exalted, are made sowr or unsavory. In like manner the Blood also, while it is Circulated in the Vessels, may be considered according to this kind of threefold disposition: First, in the making or crudity, which has relation to the Chyme new made in the *Viscera*, and freshly poured to the Blood; the Particles of which, like to unripe Fruit, are crude and undigested. Secondly, In the perfect state or maturation, which belongs to the Blood being sufficiently wrought, and made Volatile, according to all its Particles after it is inspired by Ferments, and its inkindling in the heart exalted. Thirdly, In its defection, which respects the Blood; after it hath burned forth, and its spirituous parts are very much flown away, and the rest growing old and poor, have need to be removed; and so they are either

either the Reliques of Salt, which are with the *Serum* ſtrained forth continually by the Urine; or they are Particles of Salt and Sulphur, boiled and baked together, which are ſtrained forth by the virtue of the Liver into the choleduct Veſſels: or laſtly, they are dregs and earthly recrements of the Blood it ſelf, which are carried into the Spleen, and there (as it were a *Caput Mortuum*, exalted by a new digeſtion) go into a Ferment, at length to be tranſmitted to the Blood. Whilſt after this manner, the generation of the Bloud, and its due maturation are truly diſpatched, it is pleaſingly circulated within the Veſſels, neither wanting in motion or heat, nor inordinately troubled with them. But if either the ſupplement of the nouriſhing Juice, be not made agreeable with the reſt of the Bloud, nor aſſimilated with it, but that either by reaſon of the defect of Concoction, it is waſhed into a very crude humour, or becauſe of its exceſs, it is roſted into a burnt matter; or if the Bloud growing old, does not lay aſide what it caſts off, and give way to a new nutritious Humor; I ſay, by reaſon of theſe kind of Vices, concerning Sanguification, or the making of Bloud, the Bloud is variouſly perverted from its due temper and equal motion, and now becomes watery and cold; now ſharp or ſalt; now acid, auſtere, or by ſome other way degenerate; and ſometimes obnoxious to ſtagnations, and ſometimes to immoderate heats.

We may obſerve theſe kind of degrees of Crudity, Coction, and Defection in the Bloud, both of the ſound and of the ſick; in healthful perſons after a more plentiful Repaſt, Surfeit, or hard Drinking, when too much of *Serum* or of Juice, is poured to the Blood, its whole Maſs being too much diluted with a crude humor, becomes more watery, and leſs ſpirituous; wherefore men are rendred ſluggiſh, and unfit for motion or exerciſe. In ſick perſons the Phlegmatic Conſtitution of the Body, induces ſuch a crudity of the bloody maſs, as is diſcerned in the white Dropſie, the Dropſie, *Pica*, or longing Diſeaſe, and the *Chloroſis*, or Green Sickneſs. Alſo the ſtate of this kind of crudity, comes in an intermitting Feaver, and in truth is the cauſe of the Feaveriſh acceſſion, *viz.* by reaſon of the dyſcraſie of the Bloud; the nouriſhing Juice being heaped up, is not aſſimilated to it, but for the moſt part goes into a crude, or otherwiſe degenerate matter; with which, when the Maſs of Bloud is filled to a plenitude, ſwelling up, it brings on the Fit.

The ſtate of Maturation, concoction being finiſhed, happens in healthful perſons, ſome hours after Eating, eſpecially in the morning, to wit, when the ſupplement of the Chyme is ſpiritualized, and as it were enkindled in the whole, by reiterated Circulations; for then men are made more nimble and lively, and more ready for ſtudies, or any buſineſs.

The ſtate of Defection is in the blood of ſound men after faſting long, hard labour, and want of Food, for then the Vital Spirit being very much evaporated, the maſs of the Blood begins to become as it were lifeleſs, wherefore they preſently languiſh, and are made weak. Moreover, the blood by a too long coction is burned, and grows bilous, from whence thoſe accuſtomed to want Food, or faſting, for the moſt part become ſad and melancholic. Some Diſeaſes habitually induce ſuch a diſpoſition of the blood; ſuch are the Scurvy, the yellow Jaundies, the Cachexia (or evil ſtate of the body when the nouriſhing Juice turns to ill humors) long Feavers, and moſt Chronical Diſeaſes, in which, the whole maſs of blood paſſes from a ſpirituous, into either a ſowr, ſharp, or auſtere Nature.

So much for the comparing of bloud with rich Wine; what follows, being a ſimilitude of it with Milk, conſiſts in the diverſity of the parts, and their ſetling apart, which is chiefly ſeen in its being let forth from the Veins, and grown cold in the Diſh. For when the heat and vital Spirit, which conſerve all things in the mixture, are flown away, the remaining parts depart from one another of themſelves, and a ſeparation of the thin from the thick, and of the *Serum* from the fibrous bloud is made. This ſort of ſeparation of the parts, ſucceeds almoſt after the ſame manner, as in the coagulation of Milk. There are in Milk, Buttery, Cheeſie parts, and Whey. The like is in blood, ſo long as it doth not much recede from its natural temper: for it is good, when being let forth of the Veins, it grows cold in the Porringer, its parts do ſettle after the ſame manner; to wit, the more pure portion, and ſulphureous (like Cream) comes together on the Superficies, which in healthful people, looks brightly red, and this anſwers to the flowering or head of the Milk: under this lies a purple thick ſubſtance, which conſiſts of little Threds and Fibres joyned together, and as it were concreted into a clotty ſubſtance or parenchyma, ſuch as the Liver: For the heat being conſumed, and the bond of the mixture looſned, the Fibrous parts lay holdon one another, and by their weight, ſettle into a more thick Coagulum, which anſwers to the Cheeſie part of the Milk: In the mean time, the Serous or Wheyey parts, being thruſt forth from the reſt, get their own Nature, and conſtitute a clear Liquor, like water; which as it is thinner, aſcends to the top, and ſwims upon the reſt. Further, as the Whey of Milk is wont to be further coagulated, and doth yet contain in it ſelf ſome parts both Buttery and Cheeſie; ſo this Liquor ſwimming on the Blood, if it be expoſed either to the fire, grows thick, like the White of an Egg a little roſted, or if an acid Liquor be powred to it, it will be precipitated into a white Coagulum. This being ſeen, ſome have thought this watery Latex, to be the nouriſhing Juyce, which imparts nouriſhment to the whole Body, from the maſs of

the blood, in the time of its Circulation, and that the reſt of the blood is only the Vehicle of Heat and Spirits, and ſerves for no other uſe. But to me it ſeems more likely, that in this watery Liquor is contained the nouriſhing Juyce, which is employed on the Nerves, and the commonly termed Spermatic parts, for nouriſhment is ſupplied to the Muſculous ſtock, from the fibrous blood of the Parenchyma, or the Liver, Lights and Milt. After this manner, blood being not much vitiated, goes into parts like Milk; but if it be exceedingly depraved, when it ſettles, it ſhews a far different diſpoſition, and as to its ſingle Contents, is allotted into various appearances; for the Cream growing together on the top, is ſeen to be ſometimes white, ſometimes green, now yellow, or of livid or Lead colour; alſo it becomes not tender, but very viſcous or clammy, that like a Membrane, it can ſcarce be pulled in pieces. When the blood long growing hot with a Feaveriſh Diſtemper, is let forth from the cut Vein, in its Superficies, inſtead of a Scarlet Cream, there grows together often a white Skin, or of ſome other colour; the reaſon of which is, becauſe the blood is throughly roſted, by two great Ebullition, and its more pure portion, as it were by a certain elixation, is boiled forth from a red and tender ſubſtance, to a white and tough; but if in the mean time the bloody maſs be not ſufficiently purged from the aduſt recrements of Salt and Sulphur, the colour of this little Skin becomes yellow or livid, and therefore the Water ſwimming over it, is often tinged by the ſame means. Further, the Purple Craſſament or thick ſubſtance is alſo various, *viz.* ſometimes it is of a blackiſh colour, when the blood is ſcorched too much, by a long effervescency. When the Fibres are vitiated, as in the Liver, they grow not together, but the Liquor like Beaſting Milk, remains ſomewhat thick, and yet fluid; which indeed argues a great corruption of the blood; as uſes to happen in a putrid Feaver, a very great Cachexy, ſometimes the watery Latex is wanting, as in Hectical people, and in too great a Diaphoreſis. Sometimes it ſuperabounds, as in Dropical people, neither will the whole go into a white Coagulum, by heat: In ſome Cachectical people, the blood being made more watery, appears like watered fleſh. I knew one endued with a vicious habit of Body, that was wont to have blood of a whitiſh colour, and like to Milk when it was let forth, and afterwards, when he grew better by Chalybeat Medecines, his blood was moderately red; but concerning the ſetling of the blood, and its appearances, there is enough. But as blood being emited from the Veſſels by its coagulation and departure of the parts one from another, imitates the various ſubſtances of congealed Milk, ſo ſometimes being ſhut within the Veins and Arteries, like ſome fuſed by a Coagulum, enters all together into the like mutation from Morbific Cauſes; by reaſon of which change, being hindred in its Circulation, or ſomewhere congealed and fixed according to its portions, it produces many Diſtempers: for it ſeems, that from hence the Pleuriſie, the Squinancy, the Inflammation of the Lungs, the Dyſentery, take their Original, and to this Cauſe the Peſtilent Diſeaſes ow chiefly their deadlineſs, as ſhall be ſaid hereafter in its place.

It is ſufficient that we have hitherto drawn a parallel of the blood, from which compariſon with Wine and Milk, may be gathered what ſort of Particles and Subſtances it comprehends in it ſelf, *viz.* Spirituous, and very agil or nimble (ſuch as generous or rich Wine has) for the heat and motion; and beſides ſoft and tender (ſuch as are in Milk) for the nouriſhment of the Body. Yea alſo, this Analogy of it with Wine and Milk, is yet further confirmed by the uſe of them in our Diet, out of which the blood is generated; foraſmuch as Milk is the beſt and moſt ſimple Aliment, and with it Infants, and Children, who have need of a plentiful proviſion of blood, are nouriſhed chiefly: But Wine copiouſly begets Vital Spirits before all other things, and being weak and fallen, excellently reſtores them; wherefore it is wont to be eſteemed inſtead of Nectar for old men, or thoſe of ripe years.

The Nature and Analyſis of the blood flowing within the Veſſels, being opened after this manner, the nutricious Juice deſerves yet our conſideration, being ſupplied from the blood, and ſeparated out of the maſs of blood, for the nouriſhment of the ſolid parts, and cleaving to them (whereby it may be the better aſſimilated) like Dew. For the Nerves, tendons and the reſt of the ſolid parts of the whole Body, are waſhed with a certain alible Juice. The Vital Spirits, having obtained the Nervous Bodies for a Vehicle of this, blow them forth at length, and expeditiouſly execute the actions of Senſe: alſo that Humor coming upon the ſolid parts, and aſſimilated with them, enlarges their Bulk and Growth. This is not a place to enquire after the Origin, Birth, and manner of the Diſpenſation of this: It ſhall ſuffice only that we have noted, that it is ſupplied from the maſs of blood, and (as it is rendred highly probable by the moſt Learned Dr. *Gliſſon*, and Dr. *Wharton*) after it hath paſt through the Nervous part by a certain Circulation, what remains, being now made as it were poor and lifeleſs, is ſent back by the Lymphatic Veſſels, to the blood. Whilſt this Juice, being little cocted, or purged from dregs, is ſent from the depraved blood, to the Nervous parts, 'tis wont variouſly to irritate them into Cramps and Convulſive Motions; alſo, no few Symptoms in Feavers, ariſe by reaſon of the depravation, and irregular Motion of this Juice, as ſhall be more largely laid open in another place.

CHAP.

Chap. II.

Of the Motion and Heats of the Blood.

So much for the Anatomy of the Blood, as to its primary Elements and conſtitutive parts, into which it is ſenſibly wont to be reſolved; alſo as to its Affections, which appear clearly, by the comparing it with Wine and Milk: it remains for us next to enquire concerning the motion of the blood, both Natural, *viz.* by the help of what Ferment, and by what ſwelling up of parts, it is Circulated in a perpetual motion through the Veſſels) and preternatural, *viz.* for what Cauſes, and what fury of parts, when it boils up above meaſure in the Veſſels, and conceives Feaveriſh Effervescences. Theſe being rightly unfolded and premiſed, we will enter upon the Doctrine of Feavers.

Concerning the Natural Motion of the Blood, we ſhall not here enquire of its Circulation, *viz.* by what Structure of the Heart and Veſſels, it is wheeled about after a conſtant manner, as it were in a Water-Engine; but of its Fermentation, *viz.* by what mixtion of parts, and mutual action of them together among themſelves (like Wine fermenting in the Ton) it continually boils up. And this kind of motion (as it were truly an inteſtine war of the Blood) depends both on the Heterogeneity of the parts of the Blood it ſelf, and on the various Ferments, which are breathed into the maſs of the Blood from the Bowels.

As to the firſt: thoſe things which have altogether like Particles, do not ferment, wherefore neither diſtilled Waters, Chymical Oyls, Spirits of Wine, or other ſimple Liquors are moved, as hath been already obſerved: but I have ſaid, that Blood, according to the Nature of things quickly irritable, doth conſiſt of a proportionate mixture of the Elements; in which Spirits, for that they are very nimble, continually ſtrive to expand themſelves and to fly away: but being entangled by the more thick Particles of the reſt, they are detained in their flight. And being detained after this manner, they toſs about, break to pieces, and very much ſubtilize the more thick little Bodies, by which they are hindred; they volatilize the Salt, otherwiſe fixed; by a moſt minute kneading, and by the adheſion of it, they perfectly diſſolve the Sulphur, compacted in it ſelf, and not miſcible with the reſt, and boil it in the *Serum*. They break the Earth, even to its ſmalleſt parts, and mingle it with the reſt. But in the mean time, by the ſtriking and molding the Salt and the Sulphur, *Effluvia's* of heat plentifully proceed, which being mixed with the reſt, and on every ſide diffuſed, increaſe the motion of the Fermentation. And after this manner all being moſt minutely broken and diluted with watery Particles, they conſtitute the Liquor of the Blood, , which whilſt in the Veſſels, as Wine ſhut up in a Pipe, continually ferments, and according to all its Particles is in perpetual motion.

But the Fermentation of Wine and of Blood, differs in this; that in Wine there is no waſting of the old parts, and a coming again of new; but the Liquor being ſhut up in the Veſſel, remains ſtill the ſame: but 'tis otherwiſe in Blood, in which ſome parts are continually deſtroyed, and in their place others are always generated anew. In Wine, the times of crudity, maturation, and defection, are diſtinct, and are ſucceſſively performed in the whole: In Blood, that threefold ſtate is celebrated at the ſame time and by parts: Fermentation being once begun in Wine, is continued even to the end; but in Blood, becauſe it is waſhed ſtill with crude Juices, it ought ſtill to be renewed; by which means, the Nutritious Particles, not of kin, are aſſimilated to the reſt of the Latex; wherefore, for this work, beſides the Fermentation once begun in the Blood, there is need of ſome Ferments, which may continue the ſame, otherwiſe about to leave off.

That Ferments are required for the making of Blood, this is an Argument; that when they are wanting by Nature, they are with good ſucceſs ſupplied by the work of Art: for fixed Salts, Alkali Salt, Extracts, Digeſtives, Openers, and eſpecially Chalybeat Remedies, help for this reaſon, that, as it were by a certain Ferment, they reſtore anew, the weak, or almoſt extinct Ebullition, or boyling of the Blood.

As to what reſpects the Natural Ferments, very many may certainly be formed, and in divers parts, or hid in the Bowels; for any Humor in which the Particles of Salt, Sulphur or Spirit, being much exalted, are contained, puts on the Nature of a Ferment: after this manner, the flowring or dregs of Beer or new Wine, being kneaded with Meal, and the Maſs kept to ſowrneſs, come under this rank, by which new Beer, and the like Liquors, as alſo the Maſs of Bread, are more excellently fermented. In like manner in the Ventricle, a ſowriſh Humor participating of exalted Salt, there helps Concoction: and in the Spleen, the feculencies of the Blood from Salt and Earth being exalted, go into a Ferment-

How much vigor comes to the Blood from the Womb and Genital Parts, appears from hence, becauſe by the privation, or evil diſpoſition of them, follow, in Maids the Green-ſickneſs, in Men, Barrenneſs or loſs of Virility, want of Beard, and a ſhrill Voice. But the chief Ferment, that ſerves for ſanguification, is eſtabliſhed in the Heart; for this is the chief fire-place, in which the cruder Particles of the Chyme, are as it were inkindled, and acquire a volatileneſs: which thing may be confirmed by many reaſons, but eſpecially by its effects, which we ſuffer in the Precordia, as often as the Blood ferments more or leſs than it ought to do: for when it is too much inkindled in the Heart, it is agitated impetuouſly, as it were by fires put under it; the ſigns of whoſe immoderate Ebullition are, a deep pulſe and vehement, then almoſt an intolerable heat in the Precordia, with a vehement thirſt; on the other ſide, when the Fermentation of the Blood is leſſened in the Heart, we are affected with an anhelous, and difficult reſpiration upon any motion; as may be perceived in the Dropſie, Cachexia, and Yellow Jaundice: the reaſon of which is, not becauſe the Lungs are ſtuffed, or filled full of a tough or clammy matter; but becauſe the Blood doth not rightly ferment, in that Repoſitory of Fermentation; wherefore, being fallen into its Boſom, it is not preſently Rarified; nor doth it ſoon leap forth into the Lungs, but being apt to ſtagnate, and remain there, cauſes an oppreſſion of the Heart it ſelf; for the helping of which, frequent breathing is made, that the Blood being let forth into the Lungs, ſuccour might be brought to it: but if by motion or exerciſe, the Blood be more provoked into its Ventricle, than can be derived by reſpiration, or the pulſe, into the Pneumonic Veſſels, there is danger of choaking. The like happens in thoſe that are dying: when the pulſe is very ſmall, and the Blood being heaped up in the Heart for want of Fermentation, begins to ſtagnate and to clodder, we then breath deeply, with a noiſe and elevation of the breaſt; to wit, the Blood with the ultimate endeavour of Nature, and the whole force of the Lungs, as long as it is able to be done, is emptied forth into the Lungs, leſt reſiding in the Heart, it ſhould wholly choak it.

Therefore, Motion and Heat, in the Blood, depend chiefly on two things, *viz.* partly on its own proper diſpoſition and conſtitution, by which, it being forged very greatly with active Principles of Spirits, Salt, and Sulphur, of its own accord ſwells up, or grows turgid in the Veſſels, even as Wine in the Ton: and partly on the Ferment implanted in the Heart, which very much rarifies the Liquor paſſing through its Boſom, and makes it to leap forth with a frothy heat: that the Blood, which is quietly inſtilled to the Heart through the Veins, running gently like a River, from thence leaping forth through the Arteries, (like a Torrent) with noiſe and rage, might be carried forward, to all the parts of the whole Body. By what means this is done, though it is not eaſie to explicate Mechanically, yet the manner, and ſome not improbable reaſons of this thing, are delivered by moſt Learned men, *Ent*, *Cartes*, and others. They ſuppoſe indeed, as it were a fire to be ſet in the Chimny of the Heart, which preſently inkindles the Blood infuſed through the Veins, (even as a flame put to Wine burns it) which being ſo inkindled, by its deflagration (like lightning) paſſes moſt ſwiftly through the Arteries: ſo that heat, a moſt rapid motion, and *Effluvia* ſent by Perſpiration, are wont to proceed from the accenſion of the Blood in the Heart only. *Hogelandus* affirms, that there is a Ferment hid in the Boſom of the Heart, that compels the Liquor of the Blood to boil up, and to grow hot, with heat, and a plentiful emiſſion of Soot, juſt like Spirit of Nitre, when it is poured on the Butter of Antimony: ſo that the Blood, flowing in gently through the Veins, being forthwith Rarified into ſpume and vapour by the ferment of the Heart, runs very impetuouſly through the paſſages of the Arteries. 'Tis almoſt the ſame thing, whether it be ſaid to be done, either by this, or by that way: for the alteration which the Blood receives in the Heart, may be equally deduced from a flame, or a Nitrous Sulphureous ferment, there ſuppoſed to be placed. Becauſe, whilſt the Blood ſlides into the Ventricles of the Heart, preſently the frame of the Liquor is looſned, and the active Particles, eſpecially the Spirituous and Sulphureous, the bond of the mixture being broke, do leap forth from the reſt, and ſtrive to expand themſelves on every ſide; but being kept in by the Veſſels, and being forced together with the remaining Liquor, through the open paſſages of the Arteries, they ruſh with violence, and ſwelling up by the way they can find, and by that means, diffuſe *Effluvia* of heat, through the whole body: there is little difference, whether the expanſion of the Particles of the Blood, and exertion into the liberty of motion, be ſaid to be done by Accenſion, or by Fermentation, foraſmuch as by either way, the frame of the Blood may be ſo unlocked, that from thence the Particles of Spirit, Salt, and eſpecially of Sulphur, being incited into motion, (as it were by an inkindled fire) may impart heat to the whole Body.

But this Rarefaction, or Accenſion of the Blood in the Heart, very much depends upon the diſpoſition and conſtitution of the Blood it ſelf: for if its Liquor be rightly cocted, being made volatile, and (like rich Wine) brought to maturity, it then Ferments there after its due manner, whereby the ſoluted Particles of the Spirits and Sulphur, diffuſe an equal, and moderate heat to all parts. But if the blood, by reaſon of an ill manner of feeding, and want of Concoction, be crude and watry, then it is leſs inkindled in the Heart; and from thence follow a frigid

frigid intemperance of the whole, difficult breathing and wheesing, with a weak pulse, and languishing; as in Cachectical people, those distempered with the Green-sickness, and such as are about to die, may be perceived: but if the Blood becomes too luxuriant, and apt to grow turgid, by reason of plenty of Sulphur being carried forth, or of its *Effluvia* being restrained, or of eating hot things; either its Accension or Fermentation in the Heart, is very much increased, so that from thence a Feaverish heat, and greater effervescencies than usual, are stirred up in the whole. This various Fermentation of the Blood in the Heart, according to the various temper of the same, may be illustrated by the example of Wine: fresh Must, that is yet crude, though it be boiled, or put on the fire, will not burn; but this being purified and brought to maturity, is easily inkindled, but sends forth a small flame, and quickly out. The same at first growing hot, or otherwise warmed, if inkindled, is greatly inflamed, and for the most part is consumed by its burning.

Whilst the Blood, after this manner being rarified, or inkindled in the Heart, and from thence growing hot, through the passages of the Vessels, is resolved into minute parts, some little bodies depart from its loosned frame, which refuse at last to be united, and fitted with the rest of the Liquor: but these are of a twofold Nature; either thin, which like smoke from the burning fire, or *Effluvia* from a Fermenting Liquor, do evaporate from the Liquor of the Blood, by a constant Diaphoresis, through the breathing holes of the Body; or more thick, which like ashes left after burning, or the settling dregs after Fermentation, ought to be soon strained from the mass of Blood, and to be carried forth of dores: for otherwise, by their confusion, they produce notable perturbations in the Blood. Whereby the Blood growing more hot, is dissolved in the Heart, therefore these Recrements, both Fuliginous and Earthy, are more plentifully heaped together; and when by reason of too great congestion, they cannot be presently subdued and secluded from the mass of Blood, they bring forth a swelling up of the Blood and Feaverish Heats.

Concerning the Motion, Heat, and Natural Fermentation of the Blood, in the equal tenor of which, the means of our Health consists, what hath hitherto been spoken, shall suffice. We will treat a little more largely of the preternatural, or too great effervescency, on which the Types, and Paroxysms of Feavers depend: I call that too much, or Preternatural Fermentation, when the Blood, (like a Pot boiling over the fire) grows hot above measure, and being rarified with a swelling spume, distends the Vessels, excites a more quick pulse, and like a sulphureous Liquor, having taken fire, diffuses a burning heat on every side.

This kind of motion or Fermentation of the Blood, will be best of all illustrated by an example of Wines growing hot. For Wines, besides the gentle and equal Fermentation, by which they are at first purified, at some times do so remarkably grow hot, and boil up, that they fly out of the mouth of the Vessel, and if they are closely stopped up, cause it to burst in pieces. After this manner, as if struck with fury, unless they are immediately drawn away from the Tartar; or their Lees into another Vessel, they will not cease from growing hot, until the Spirit being very much loosned, and the Sulphur or Salt too much exalted, they are either made unsavory, or degenerate into a sowrness.

Such an Effervescency is wont to be stirred up for two causes chiefly: First, When any extraneous thing, and not miscible, is poured into the Ton, (so some drops of Tallow, or Fat, being dropped into the Cask, will produce this motion) or secondly, when Wines being enriched with too rich a Lee or Tartar (by reason of the sulphureous parts being above measure exalted) conceive heats of their own accord, and exceedingly boil up. For in whatsoever substance Sulphur abounds, and its Particles being loosned from the mixture, consociate together, and are bound close in one, there such immoderate heats are procured.

After a like (tho' not wholly the same) manner, whereby Wines grow hot, the boiling up of the Blood is induced; to wit, either what is forein, and not akin to the Blood, is mixed with it, that when it is not assimilated, is wont to cause a Perturbation, and growing hot, until that Heterogeneous thing, is either subdued or cast forth of dores; and the Particles of the Blood being confused and troubled, are at last shaken forth, and that they get again their former place and position in the mixture. Or, Secondly, the Blood grows hot above measure, because some Principle, or its constitutive Element, (*viz.* Spirit or Sulphur) is carried forth beyond its Natural temper, and becomes enraged; whereby indeed the Particles of this or that, being not agreeable to the rest, are loosned from the mixture; being loosned, they become more violent than they ought, shake much the Liquor of the Blood, and bring forth a heat, which is not allayed, till the Blood being as it were inflamed, burns forth with the long fire of a Feaver. By either way, whether the Blood grows hot in the Vessels, by reason of the pouring in of a thing not miscible, or by reason of the rage of the Spirit, or Sulphur being carried forth, because from thence its frame is more loosned, therefore it is more inkindled in the Heart; and the active Particles first loosned from the Ferment there implanted, do grow exceeding hot, leap forth from the mixture, and disperse on every side by their motion, a strong heat, and as it were fiery: but yet with this difference, that the Effervescency, which depends upon the mingling

mingling of ſome extraneous thing with the Blood, is for the moſt part ſhort, or renewed, which, when what was Heterogeneous is ſeparated or ſubdued, is quieted of its own accord, and the ſhaken parts of the Blood, and put out of order, eaſily return to their Natural ſite and diſpotion. But the Ebullition which ariſes from the inordination of the Spirit or Sulphur being enraged, is continual; to wit, here the whole maſs of the Blood is ſo looſned, and diſſolved from the ſtrict bond of the mixture, that as an Oily Liquor having taken fire, it ceaſes not to grow hot, or to be inflamed, till the Particles of Spirit, or Sulphur, or the combuſtible matter, be for the moſt part burnt out.

There remains yet a third manner of Preternatural Fervency, whereby the Blood is ſubject to alteration, which happens not to Wine, but moſt often to Milk; *viz.* when at any time, from a Morbific cauſe, a coagulation of its Liquor is induced, ſo that its ſubſtance is poured forth, and goes into parts, and there is a ſeparation made of the thick and earthy from the thin; by which means the Blood is not fitly circulated in the Veſſels, but that its congealed portions, being apt to be fixed in the extream parts, or to ſtand ſtill in the Heart, do interrupt the equal motion, or grievouſly hinder it: For the ſake of the reſtoring of which Effervency, greater are wont to be ſtirred up in the Blood, to wit, ſuch as happen ordinarily in a Pluriſie, the Plague, Small Pox, or the Venereal Diſeaſe.

CHAP. III.

Of Intermitting Feavers or Agues.

BY the Premiſes which we have ſpoken of already, concerning the Anatomy, Motion, and Heats of the Blood, there now lies open an eaſie paſſage to the handling of Feavers. The Notions which are commonly ſet forth, concerning a Feaver, out of the force and Etymology of the word, I here purpoſely omit: It may be deſcribed after this manner, that it is, An inordinate motion of the Blood, and a too great Heat of it, with burning and thirſt, and other Symptoms beſides, whereby the Natural œconomy or Government, is variouſly diſturbed. As we have remarked already, concerning the growing hot of the Blood, ſo now we do of a Feaver, that indeed, its acceſſion is either ſhort, and by fits, which is therefore termed Intermitting; or elſe great, and long protracted, which is called a continual Feaver. We will firſt ſpeak of the Intermitting Feaver.

Tho' an Intermitting Feaver, in our Popular Idiom, is known by a proper Name, and is diſtinguiſhed contrary to a Feaver commonly taken, yet becauſe it hath too great Effervency of the Blood joyned to it, it is to be called a Feaver. It is peculiar to this, from a continual Feaver, that it hath certain remiſſions, or times of intermiſſion; that every fit begins with cold or ſhaking, for the moſt part, and ends in ſweat; that the acceſſions or coming of the fits, return at ſet Periods, and certain intervals of times, that a Clock is not more exact. Wherefore, we will firſt diſcourſe concerning this Feaver in general, what ſort of heat of the Blood it is which continues its fit, and from whence it is raiſed up. Secondly, Wherefore the fit appears equally with cold and ſhaking, as with ſweat following. Thirdly, What may be the cauſe of the Intermiſſion, as alſo of its certain ſet Periods. Fourthly and Laſtly, Are added ſome irregularities of Intermitting Feavers, as when now cold, now heat or ſweat is wanting; or when the Periods are wandring and and uncertain, when the Remiſſion or ſpace of Intermiſſion, is not equal, but now comes ſooner, now later, and ſometimes redoubled: and I will endeavor to ſhew the reaſons of theſe, and of other Phenomena or appearances, which variouſly happen in this Diſtemper. Theſe being laid open, we will go on to unfold in the next Chapter, the diviſion of an Intermitting Feaver, and the kinds of it.

As to the firſt: The Effervency of the Blood in an Intermitting Feaver, (or Ague) for the time of the fit, is as violent and ſtrong as in a continual Feaver: wherefore, it is concluded, that the parts of the Blood, among themſelves, or ſome heterogeneous thing being mixed with it, do ſtrive together, and ferment above meaſure. But there is required, that they may ferment, or too greatly boil up among themſelves, that ſome Principle, as chiefly Spirit or Sulphur, being too much exalted and enraged, do appear above the reſt; which, when it cannot be yoaked with them, brings in a continual ſtrife and heat: but from this cauſe, a continual Feaver draws its riſe, becauſe ſuch an Ebullition of the Blood, being once begun, is not ſuddenly allayed, and when it is appeaſed, it does not afterwards preſently return. Wherefore for an Intermitting Feaver, 'tis to be ſuppoſed, that ſome heterogeneous thing is mingled with the Blood, whoſe Particles, when they are not aſſimilated, make ſo long an Ebullition of the ſame, till either being kneaded, they are rendred miſcible, or being ſubtiliſed, are ſhut forth of dores. Wherefore, ſuch a matter being brought under, or

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ſhut forth of dores, the fit ceaſes, and when this matter ſprings again, it ſtirs up a new Ebullition, and ſo a new fit is brought on.

Concerning this Matter, which being mixed with the Blood, induces the periodical Heats, and the other Symptoms of an Intermitting Feaver, 'tis very ambiguouſly, and diverſly diſputed among Phyſicians, where it is generated, in what ſeat or place it lodges, and by what means it ſo exactly obſerves the times of its Motion, and Ebullition. But it would be a work of too much labour and tediouſneſs, to recount here all the Arguments, of the Ancients, and Moderns, to reduce them into order, and to weigh their reaſons; Wherefore, doubting, I propoſe what has come into my mind, when I thought deeply of the matter, and ſubmit to the Judgment of others.

Of neceſſity there is ſomething, which brings in the Heat of the Bloud exactly periodical, that is generated in our Body at the ſeveral periods, or acceſſions of the Feaver, always in a ſet meaſure, and equal proportion, and is communicated to the maſs of Bloud; with which when the Bloud is filled to a plenitude, it forthwith grows turgid, and conceives an heat: But this is ſuppoſed to be either an Excrementitious humor, ſliding down into ſome Mines, which by de-degrees, and at a ſet time, being brought to an increaſe, and moved, Ferments with the Bloud: or it is the nutritious Juice, ſupplied from the matter of Food, and delated in weight and meaſure, which, when it is not aſſimilated, by reaſon of a defect in ſanguification, being heaped up to a fulneſs, for its own expulſion, induces a turgency in the Bloud. The reaſon of Intermitting Feavers, is commonly explicated by the former way, and the cauſes of the Intermiſſion, and ſet times of approach, are fetcht from the nature of the Humor, and the ſeat, or place where it is cheriſhed. The Neſt, or Mine of this Diſeaſe, almoſt by an unanimous conſent, is fixed on the firſt ſhop of the Body, and from hence the reaſon of the Intermiſſion is fetched, and the continual difference of an Intermitting Feaver: but they affirm the matter to be Choler, Phlegm, and Melancholy; and as theſe humors are ſaid to putrifie ſlower, or ſooner, ſo the Feaveriſh courſes, are ſaid to be abſolved, in the ſpace of one or more days. But this Opinion, after the Circulation of the Bloud hath been made plainly known to all, is deſervedly rejected. For when the Bloud never ſtagnates in the Veſſels, but waſhes every place with a perpetual motion, and continually carries away their filth, it is impoſſible that the Mine of this Diſeaſe ſhould ſubſiſt in the Meſaraick, where it is commonly aſſerted to be: as to what belongs to the cavities or dens, for the heaping up of the humors in the Viſcera, it neither appears, by what means ſuch ſhould be formed without a Tumor or Impoſthume; nor by what inſtinct, ſuch humors, ſhut up in their Neſt, do increaſe, are conſumed, and laſtly ſpring forth again, at ſo exact intervals of times. Beſides, what is affirmed concerning Bile, Phlegm, and Melancholy, and of their periodical motions, we hold wholly ſuſpected; becauſe theſe ſort of humors, are not afforded ſincere, ſuch as are deſcribed in the Schools: but the Bloud, having gotten a various diſpoſition, now being hotter, now colder, its nature imitates the qualities of ſuch humors; or in its Circulating, it lays aſide its Recrements, which being depoſited in little Cheſts or Veſſels, are falſely believed to be Morbific, and Preternatural humors. Wherefore, as the nutritious Juice, is the only humor wherewith the maſs of Bloud is daily refreſhed, and its ſupplements are made ſtill in meaſure, and proportion, without doubt, the periodical heats of the Bloud, are to be drawn from the acceſſion and commixtion of this.

I have already remarked concerning the Particles of the Bloud, a triple ſtate of crudity, maturation, and defection: to wit, the nouriſhing Juice, ſupplied from the daily Food, comes crude, is mixed with the Bloud, and being for ſome time Circulated, is aſſimilated to it, and is ripened into a perfect humor: afterwards growing ſtale, it goes into parts and is laid aſide. Whilſt after this equal manner, the Bloud is continually reſtored, and its loſſes repaired, it very quietly Ferments, without any trouble, or immoderate heat, and is Circulated within the Veſſels; but if the ſupplement of the nouriſhing Juice, is not (as before) ripened, nor goes into Bloud, by a perfect digeſtion, its Particles being confuſed with the Bloud, remain as it were ſome Heterogeneous thing, and not exactly akin, in the maſs of Bloud; with which, when it is filled to a plentitude, the Bloud forthwith grows troubled, and conceives a Feaveriſh heat, whereby the freſh ſupply of this depraved Juice, is either overcome, or caſt forth of dores. I ſay, therefore, from the firſt inſtant, in which the nouriſhing Juice is not aſſimilated with the Blood, its Particles, though mixed with it, are as yet Circulated with it, without any great tumult or perturbation, and ſo afterwards, till the maſs of the Bloud is filled with them to a turgency: but then it quickly boils up, and conceives a heat: almoſt after the ſame manner, as new Beer put into Bottles, which, if they are cloſely ſtopped, that nothing may evaporate, is at firſt contained in thoſe Veſſels, without heat, or force; afterwards, when the *Effluvia* being ſtill reſtrained, the maſs of the Liquor ſwells up, notably Ferments, and by reaſon of the force of Fermentation, oftentimes makes the Bottles fly in pieces: alſo this happens at a ſet time, and in the ſpace of ſo many hours, as in an Intermitting Feaver, the Liquor ariſes to its height of turgeſcency.

There yet remains a difficulty, for what cauſe the Nutritious Juice, being confuſed with the Bloud, is not aſſimilated, but degenerates into an Heterogeneous, and Fermentative Matter: I ſuppoſe this to be done, for the moſt part, not by the default of the Aliments, nor yet of the Bowels, but by the vice of the Bloud it ſelf. For the Bloud, even as Wine, ſometimes paſſes from its native and genuine diſpoſition, into an acid, ſowr, or auſtere diſpoſition; and becauſe the Bloud makes Bloud, it comes to paſs, that when it is departed from its due temper, it eaſily perverts the proviſion of the Nutritious Juice, by which it ſhould be repaired. What that diſpoſition of the Bloud is, and by what means contracted, ſhall be told hereafter, when we ſpeak of the kinds of Intermitting Feavers, and of their evident, and Procatarctick Cauſes. The Heat, or Effervescency therefore of the Bloud, which conſtitutes the fit of an Intermitting Feaver, depends only upon the aſſimilation of the nouriſhing Juice being hindered; the Particles of this being commixed with the Bloud, are not (as before) ripened, nor are made into perfect Bloud; but by the mixture of theſe, the maſs of Bloud (as it were new Drink) is imbued with little bodies greatly Fermentative; when the which are more thickly heaped together, and the Bloud is filled with them to a ſwelling up, it preſently grows hot, and a mighty agitation, and ſtrife of the Particles is made, by which, they break, and ſubtiliſe one another, till at length the Vital Spirit getting the dominion, and the reſt being brought under, what is extraneous is thruſt forth of dores, from the company of which, the Bloud being freed, the remiſſion, and intermiſſion of the aguiſh fit follows; but afterwards from a new ſupply of this Juice, a new fit is brought on.

Secondly, As to the ſhaking, or cold preceding the heat, in this Diſtemper, I ſay, when the Particles of the nouriſhing Juice, do proceed from a ſtate of crudity, towards maturity, but do not attain it, they contract a notable ſowriſhneſs, with which they greatly prick, and haule the nervous parts, and cauſe the ſenſe of cold: even as new Beer, which being ſtopped cloſe in Bottles, paſſes from a ſweet into an acid and nitrous taſte, that for the cuttingneſs and cold, can ſcarce be ſwallowed. When therefore, the Particles of this ſort of crude Juice, being indued with a Nitrous ſowrneſs, do fill the maſs of the Bloud to a fulneſs, or to a ſwelling up, and when they being more thickly heaped together, begin to enter into a Flux, they firſt of all ſtrike down the Vital Spirits, with their ſharpneſs, and ſomewhat overthrow their heat; wherefore the Bloud becomes colder, and is more ſlowly circulated: yea, and by reaſon of the defect of heat, the ſenſe of cold is perceived in the whole body, and a pulſe very rare exiſts. Moreover, When the nervous and ſolid parts, are watered with this ſort of acetous Juice, for their laſt nouriſhment, by the Flux of this, which happens together with the turgeſcency of the Bloud, theſe ſenſible parts are pulled, and irritated into Tremblings, and Convulſions. And this, without doubt, is the true and genuine Cauſe of the cold and ſhaking, which are excited in a fit of the Intermitting Feaver; to wit, the Flux, and ſwelling up of the nouriſhing Juice, degenerated into a Nitrous Matter, with which the Spirits and heat being ſuffuſed, are blunted, and the Nervous Bodies, being provoked, are moved into Tremblings. But afterwards, when theſe Nitrous Particles being thruſt forth, from ſome part, into the Superficies of the body, the Bloud is ſomewhat freed from their weight and oppreſſion, the Vital Spirits recollect themſelves, and begin to ſhine forth; but from thence a moſt intenſe heat ſucceeds; becauſe, both the maſs of Bloud, by reaſon of the growing hot with the Feaveriſh Matter, being looſened, and alſo it mixture being laxed, the Sulphureous Particles are more plentifully inkindled in the Heart; and becauſe (the Pores of the Skin, being poſſeſſed by the ſame Matter, thruſt forth towards the circumference of the body) the vaporous *Effluvia* are reſtrained within, which do more ſhake, and make hot the the Bloud; that heat perſiſts ſtill in the Bloud, until that Fermentative Matter being wholly burnt out, and together with the aduſt recrements, remaining after the burning, being fully brought under, and ſubtiliſed, and involved with the *Serum*, inſenſibly evaporates by ſweat, or tranſpiration.

Thirdly, Theſe things being premiſed, it will not be hard to ſhew the Reaſons and Cauſes of the Intermiſſion, as alſo of the ſet Periods, *viz.* the Intermiſſion follows, becauſe all the Morbific Matter is diſperſed in one fit, and ſo till new be ſubſtituted, there is a neceſſity that a remiſſion follow. But new Matter begins to be begot, of which the laſt fit failed; to wit, the maſs of Bloud being now emptied, receives the nouriſhing Juice, and perverts it (as before) by reaſon of its defect of due making of Bloud, and of Concoction, into a Fermentative Matter; but its little plenty, ſtirs up little or no trouble, or Fermentation; but when the Bloud is filled to a ſwelling up, it preſently Ferments, and is in Flux, even as when new Beer, or new Wine, ſhut up a long while in a Veſſel, at length, at a certain time, boils up, and leaps forth at the mouth of the Veſſel.

But that the Fits, or Acceſſions, do for the moſt part come again, at ſet intervals of times, and that ſo certainly, that a Clock is not more exact; the reaſon is, becauſe the nouriſhable Juice, is

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for the moſt part ſupplied from the Viſcera, to the Blood flowing in the Veſſels, in an equal meaſure and manner; for though we do not daily take exactly ſo much meat and drink in weight and dimenſion, yet, becauſe we for the moſt part eat at ſet hours, for the ſatisfying the Appetite, from the things eaten, and the maſs of the Chyme heaped up in the Bowels, an equal portion of the nutritious Juice is conveyed to the Blood through the Milky Veſſels; wherefore, if at ſuch hours, ſo much of the nutritious humor is poured into the Blood, which encreaſing to a fulneſs, and ſwelling up, it brings on the Fit that day: certainly, this being finiſhed, in the ſpace of the ſame time, ſufficient matter is laid up, for the following fit: But if Errors in feeding be committed, and that the ſick indulging their Appetite, eat more plentifully or inordinately, the approach of the fit anticipates the wonted hour, by reaſon of the Bloods being filled ſooner with the Feaveriſh Matter; if that the ſick are abſtemious, and more ſparingly take their food, the intermiſſion is drawn out longer.

If it be yet asked, wherefore the periods of intermitting Feavers be not of one kind, and of the ſame diſtance, but that ſome repeat, and come again daily, others on the third and fourth day? The cauſe is the diverſe conſtitution of the Blood, to wit, whereby it is perverted from its due temper, now into a ſowriſh, now into an acid or ſharp,, or into an auſtere or harſh diſpoſition. By reaſon of the diverſe evil conſhitution of this, the alible Juice, being freſh carried, departs more or leſs from maturation, and is perverted into matter, apt ſooner or later to ferment. When the Blood has acquired a ſowr, hot, and bilous diſpoſition, I ſuppoſe that ſome part of the nouriſhing Juice is ripened into perfect humor, and is aſſimilated with the Blood, and ſo goes into food, to be carried to the ſolid parts, and is affixed to them; but the other part of it, from the Blood being too much cocted, and depraved, is changed into a feaveriſh matter, and ſuppoſing that half of the nutritious Juice is after this manner perverted, in double the time, in which it is ſaid to have a full concoction in our Body (that is, after eight and forty hours) this kind of fermentative matter riſes to a plenitude and turgeſcency, and then induces the fit of a Tertian Feaver. If that, by reaſon of the auſtere, and pontic nature of the degenerated Blood (in which a fixed Salt, with an earthy *Faces* is exalted too much) and therefore apt to ferment more ſlowly, only a third part of the nutricious Juice is corrupted, then in three times the ſpace of the aforeſaid time, the fit is induced; that is, after ſeventy two hours, in which, the period of a Quartan is wont to be concluded. But, if by reaſon of a greater infection of the Blood, almoſt the whole ſupplement of the nutricious Juice is perverted into a Feaveriſh matter; then in the ſpace of that time, in which the plenary coction ought to be abſolved in the Veſſels and habit of the body (that is, after twenty four honrs) this matter ariſes up to the motion of turgeſcency, and brings on the quotidian fit. And hence it comes to paſs, that in a Quartan Feaver, ſtrength and courage do not preſently fail, whilſt in a Tertian, the ſick are wont to become more weak; but in a Quotidian Feaver, they are ſooner brought into languiſhing, and greateſt weakneſs: to wit, in each, as more or leſs of the nutricious Juice goes into the food of the Diſeaſe, ſo much alſo is drawn away from the ſtrength and firmneſs of the Body. But more fully of theſe, when we treat of the ſeveral kinds of Intermitting Feavers, and the Cauſes of them.

Againſt the equal Circuits of theſe Feavers, it is argued, that for the moſt part, the fits do anticipate the ſet time of the day, by the ſpace of ſome hours, and ſometimes alſo come after it. But in truth this Objection is taken away, if the times of Intermiſſion be computed, not by days, but by hours; for ſo the intervals which but now ſeemed to be now ſooner, now longer protracted, will appear for the moſt part equal, by this Rule; foraſmuch as in reſpect of the day, it is ſaid a Tertian Feaver, ſometimes prevents the wonted time of its acceſſion, two, three, or more hours, or comes after it; in the mean time, every Circuit exactly repeats or comes again, every time after ſo many hours. Wherefore the chief differences of Intermitting Feavers conſiſts in this only, that the time of the acceſſion in one Feaver, comes more ſwiftly, and in another more ſlowly, *viz.* now at twenty four hours diſtance, now at thirty four, now at ſeventy, or the like.

From what hath been ſaid (unleſs I am deceived) it clearly appears, what the Effervescency of the Blood is, which conſtitutes the fit of an Intermitting Feaver, from whence the fore-runners of cold and ſhaking, and laſtly, what may be the reaſon of the Intermiſſion, and of the ſet periods. But that theſe, and many other Appearances of this Diſtemper, depend upon the evil diſpoſition of the Blood, and becauſe of the depravation of the nutricious Juice, and not from humor, lurking in ſome Mine, will yet more manifeſtly appear from the collation of the Signs and Symptoms, which are to be met with, worthy of note, in this Diſtemper: then ſecondly, from the Procatartic, or more remote cauſes being truly weighed, which are wont to induce this Diſtemper: And thirdly, and laſtly, from the ways of the Criſis, and Cures, by which this Diſeaſe either ceaſes of its own accord, or is driven away, by the help of Medecines.

Firſt, Among the Signs, the Pulſe and Urine deſerve the chief conſideration: The Pulſe, the cold fit coming on, is very rare and low; which clearly argues, the Heat, and Vital Spirits

in the Blood, to be as it were overwhelmed by ſome crude matter, not eaſily combuſtible; juſt as a fire enkindled on the Hearth, and then covered with green wood, glows very ſlowly, and flames forth very little, which afterwards, the crude humor being blown away, breaks forth into an open and very ſtrong flame; ſo alſo, the Blood, the crude matter, which is in Flux, being ſomething overcome or diſperſed, is very much enkindled; and what remains in the Blood is burnt up, when fermenting with the Particles of it, and induces a moſt violent heat, with thirſt; wherefore the Blood growing impetuouſly hot, is urged with a vehement, and moſt ſwift Pulſe; otherwiſe it being too much heaped together in the Heart, might cauſe the danger of choaking.

As to the Urine; that is imbued (eſpecially, in a Tertian Feaver) with a deep colour, and as it were enflamed, alſo when the contents are wanting; which ſeems to denote a ſcorching of the Blood, and too aduſt temper: moreover, in this Diſtemper, different from others, the Urine, for the moſt part is ill, when the Patient is pretty well, and on the contrary; foraſmuch as all the time of the Intermiſſion, it is at a great diſtance from its natural ſtate, it becomes filled with a red colour, and thick, being expoſed to the cold, and lays down a plentiful ſediment, like to Bole-Armoniack; which is of neceſſity to be ſo done, becauſe in the whole interval of the remiſſion, the Feaveriſh matter is circulated with the Blood, and there riſes to maturity, with a ſecret increaſe. But in the middle of the fit, when the heat and burning are at the greateſt, the Urine is laudable, and comes more near to the natural, *viz.* the fermentative matter, being ſent to the circumference of the Body.

The Symptoms preceding the fit, confirm the ſame thing; for many hours before the fit begins, a perturbation of the humors, and blood, is perceived; an Head-ach, Vertigo, ſparkling of the Eyes, unquiet Sleep, *&c.* which plainly ſhew the Blood firſt infected with the fermenting matter, and the aſſault of the fit to be only ſo long deferred, until the maſs of the Blood is filled to a ſwelling up, with the ſame kind of matter: the fore-runners of the approach of the fit, are, now a paleneſs at the ends of the Fingers, or Toes, or in the Nails, ſometimes a convulſion or numneſs; now a coldneſs, and pain in the Loins and Thighs, and ſometimes a ſhivering and trembling invade the Body, which clearly ſhew, the Blood in the Arteries and Veins, and alſo the thin Liquor in the Nervous parts, firſt to conceive the motion of Fermentation, and this Effervency not to be excited from any other Fire-place, or Mine. If it be objected, that the ſick are moſt often infeſted with Vomiting, about the time of the fit; from whence it may ſeem to be concluded, that the chiefeſt hurtful matter is eſtabliſhed in the Ventricle, and in the firſt paſſages, eſpecially when this Diſtemper is chiefly cured, by the timely taking of a Vomit; I confeſs, very great Vomitings are ſometimes ſtirred up in the fit of an Intermitting Feaver; but this more often happens, becauſe in the Feaveriſh ſhivering, the membranes of the whole body are pulled; wherefore the Ventricle alſo. as it is a very Nervous part, is diſtempered with a Convulſion, and having from thence contracted a Spaſm, caſts forth upwards whatſoever lurks in its boſom. Beſides, if that the choler-bearing Veſſels ſwell up with Bile or Choler, by the ſame Convulſion alſo of the Viſcera, the Bile is preſſed forth into the Duodenum by the galliſh paſſage, and is emptied into the Ventricle, and there by its fierceneſs, provokes yet to a more cruel vomiting, wherefore for the moſt part, the vomiting which is excited for this reaſon, follows the ſhaking only. But that the Choler was not in the Stomach before the fit troubled it, but only preſſed forth from the Choleduct paſſage, by the Spaſm and convulſive motions of the Viſcera, and poured forth into the Ventricle, appears from hence, becauſe if a Vomit be given in the midſt of the interval, between the two fits, little or nothing of bilous matter will be drawn forth; beſides this bitter humor is of that fierceneſs, that it cannot be long contained in the Ventricle, but preſently it will procure the pain of the Heart, and Vomiting. Beſides this ſort of Vomiting, excited in the ſhaking fit, ſometimes a Vomiting is provoked in the midſt of the burning fit, or in the ſweat, the cauſe of which is the redundancy of the biliſh humor in the Blood; of which if there be greater plenty, than what diluted with *Serum* may be ſent forth by Sweat, a great part of it, whilſt the Blood is circulated about the Creviſes of the Liver, is laid aſide in the Choleduct Veſſels; which, when being filled to a diſtention, exonerate themſelves, and ſend away the Choler to the Inteſtines and Ventricle, and there a Convulſion being preſently ſtirred up, ſometimes Vomiting is provoked, and ſometimes the belly becomes looſe, and the Stools liquid. In this Year 1657. I obſerved very many affected after this manner, for when after an hot and dry Summer, about the middle of Autumn, an Intermitting Feaver generally raged, the ſick were wont ſuddenly to grow very ill, in the middle of their hot fit, and ſometimes alſo in their Sweating, and the Sweat being ſtruck in, to be taken with Swooning; but ſhortly after, when a Choleric Vomiting followed, they were eaſed.

Not only the ſigns and ſymptoms, but the Procatartic or more remote Cauſes of this Diſeaſe, clearly indicate, that it takes its riſe from the temper of the Blood being changed; becauſe Intermitting Feavers are moſt frequent in the ſeaſon, and places, in which the Blood receives the greateſt alteration from the Air, *viz.* either in the Spring, when the Vernal heat ſhutting out the Winters Cold, cauſes the Blood, before benummed, and apt to be more ſlowly moved, to begin

to

to flouriſh, and luxuriate in the Veſſels, and from thence, to get a bilous and hot temper: or in the Autumn, when the Blood being torrified, or roſted by the Summers heat, and therefore its Spirits very much depreſſed, and Salt and Sulphur exalted, acquires now a ſharp and Choleric, now a binding and auſtere diſpoſition; wherefore, at this ſeaſon, Feavers, now Tertian, now Quartan, are frequent; beſides, in ſome places, there is that conſtitution of the Heaven, that on all men whatſoever, there comes either a Tertian or (more frequently) a Quartan Feaver; although in the firſt Offices, where the Mine of the Diſeaſe is commonly believed to be lodged, there be no congeſtion of humors, by reaſon of an ill manner of living, or ſickly diſpoſition. Yea, they moſt eaſily fall into this Diſeaſe, who have their Inwards firm and ſtrong, and who abound with a lively heat: on the contrary, thoſe who by reaſon of a weak concoction, heap up Crudities in the firſt paſſages continually, that they are prone to the Dropſie, or Cachexia, remain free, for the moſt part, from this Diſtemper, to wit, the Blood being made more watery, (like Wine degenerated into a taſteleſs ſubſtance) is altogether unapt to be fermented.

No leſs doth the Cure of Intermitting Feavers ſeem to prove this our Aſſertion, whether it be Natural and Critical, or Artificial, and performed by the help of Medecines. As to the firſt, Intermitting Feavers are wont to be terminated after a twofold manner. The firſt is, when from the fits themſelves the temper of the Blood is altered, and oft-times is reduced into its natural diſpoſition. For when in every coming of the fit, very much of Sulphur, and aduſt Salt is burnt out, and exhaled by Sweat, the Liquor of the Blood, by that means becomes more temperate, and leſs torrid: wherefore, oftentimes this Diſeaſe is cured, at ſix or ſeven periods, and of its own accord ceaſes; but if it be longer protracted, and that the Blood being ſomewhat changed from the ſharp and bilous temper or diſpoſition, is not reſtored to its natural temper, ſometimes it degenerates into an acid, watery, and alſo pontic or ſaltiſh temper, from whence a long Tertian Feaver paſſes into a Quotidian, or a Quartan; alſo oftentimes, becauſe the Blood is greatly depraved, by the long continuance of this Feaver, the Jaundies, or the Scurvy, or the Cachexia follow. The other manner, whereby this Diſeaſe is terminated, is, when the change of the Air, or the Country, brings a notable alteration of the Blood; for ſo Feavers begun at the times of the Equinoxes, are ended about the time of the Solſtices; alſo the ſick, travelling into another Region, often grow well.

As to the Cure of it, by the Inſtitutions of the Medecines, it uſes to be done two ways, *viz.* Empirically, and Dogmatically; and in this Diſeaſe, Empirical Remedies, ſought from Quack-ſalvers, and old Women, are more eſteemed, and oftentimes do more than the Preſcriptions of Phyſicians, adminiſtred after the exact method of Curing.

Empirical Remedies, which are ſaid to cure Intermitting Feavers or Agues, are of that ſort, which drive away the approaching fit, without any Evacuation, and are either taken inwardly, or are outwardly applied, where the Pulſes chiefly beat, *viz.* For the moſt part, they are bound either to the region of the Heart, or to the Hand-wriſts, or to the Soles of the Feet; theſe ſometimes are ſo commonly known to help, that ſome have warranted the ſudden Cure of this Diſeaſe, by theſe Remedies, under the pain of ſome forfeiture: Wherefore it is worth our enquiry, how theſe operate, and by what way or means they ſtop the Feaveriſh acceſſions. It is clear, Firſt, that thoſe which are outwardly applied, do immediately impart force and action to the Blood and Spirits; and when they drive away the fit, by preventing, without the evacuation of humor, or any matter of neceſſity, the reaſon of this effect conſiſts only in this, that by the uſe of theſe ſort of Medecines, the turgeſcency or ſwelling up of the Blood, with the feaveriſh matter, and Fermentation are ſtopp'd; to wit, from the Medecine tied about the Body, certain little Bodies or *Effluvia* are communicated to the Blood, which do very much fix and bind together the particles of it, or alſo, as it were precipitate them, by fuſing and ſhaking them; and by either way, the ſpontaneous growing hot of the Blood, is hindred; as when cold water is put into a boiling Pot, or as when Vinegar, or Alum is flung into new and working Beer, preſently Fermention ceaſes. and the Liquor acquires a new taſte and conſiſtency, whereby it becomes fit to be drunk, as if it had been kept to ripen along time. But that theſe Ague-ſtoppers do work after this manner, it is plainly ſeen, becauſe thoſe which are of principal note, do excel in a Styptic, and binding force, or elſe with a precipitating virtue; hence Sea-ſalt, Nitre, Sal-gemmæ, the juice of Plantane, Shepherds-burſe, any binding herbs pounded with Vinegar, and the like, bound to the wriſts, the root of Yarrow, Tormentil, alſo Camphire hung about the neck, are ſaid to take away this Diſeaſe: yea, thoſe alſo which are taken inwardly, are of the ſame rank; the Juice of Plantan, Red-Roſe water, Alum, for that they fix, and conſtrain the Blood, a decoction of Piper, Sal Armoniac, or of Wormwood, Spirit of Vitriol, alſo a ſudden paſſion of anger, or fear, foraſmuch as they precipitate the Blood, by fuſing and ſhaking it, do oftentimes hinder the Agues approach: even as the concuſſion, and ſhaking much any Liquor, or the infuſion of aſtringent things into it, hinder its ſpontaneous effervescency and rage. It is uſual with ſome Empiricks, for the cure of Agues, to tie a little knot in a Linnen Rag, or a piece of Paper rolled up, ſo ſtrictly to the wriſts, preſſing hard upon the beating of the Pulſe, that the circulation of the Blood is ſomewhat hindred, and by this means, the Aguiſh fit coming on, is driven

driven away. Very many by this way, I have known to be cured of a tedious ſickneſs; the reaſon of which ſeems to be, that whilſt the Blood is hindred from its motion in any part, it grows more tumultuous in the other parts; and ſo by this perturbation, ſtirred up in the whole Blood, the ſpontaneous Effervency of the Liquor, being about to follow, is hindred. But that the fit, by this, or any other means, being once hindred, does not afterwards eaſily return, the reaſon is, becauſe, if this feaveriſh and depraved matter be contained longer in the Blood, it is afterwards cocted, and in ſome meaſure ripened; and therefore the Blood does not (as before) altogether pervert, either this, or the proviſion coming to it anew, but begins to digeſt and aſſimilate it; beſides, when the fit is once ſtopp'd, its cuſtom is broke, by the inſtinct of which alone, Nature oftentimes repeats thoſe her Errors: for, as when it has once made a fault, it is wont more readily to do ill after the ſame way; ſo when it once omits its fault, it more eaſily accuſtoms it ſelf to do better.

The dogmatical Cure is inſtituted for the moſt part, by Vomitory and Purging Medicines, alſo with the letting of Blood; with which the ſick are miſerably tormented, and the Diſeaſe ſeldom profligated or driven away, that deſervedly, this Diſtemper is called the Shame of Phyſicians; but Tertian Feavers are ſometimes carried away by a Vomit given juſt before the coming of the fit, which indeed happens (as I think) for the reaſon before mentioned. For I have ſaid, That the cauſe of a Tertian Feaver, is an evil diſpoſition of the Blood, whereby it paſſes into a ſowr and bilous Nature; and therefore it doth not rightly aſſimilate the nutritious Juice brought to it, but changes it into a fermentative Matter; wherefore, if the Bile or Choler be copiouſly drawn forth of the Blood, that Choleric and hot Intemperance is very much taken away, and that fermentative power ceaſes of it ſelf; But Emetick Medecines do chiefly perform this; for if they operate ſtrongly, a Convulſion is not only brought to the bottom of the Ventricle, but alſo the *Duodenum*, with an inverſe motion, is drawn together towards the Pylorus, and the Choler by a continual thruſting forward, being ſqueez'd forth from the Choleduct paſſage, is poured into the Ventricle, which is preſently caſt out by Vomit; which being copiouſly performed, the galliſh Bladder is almoſt emptied, and after that, it becomes a receptacle, that draws forth, and ſeparates the bilous humor, or the Particles of aduſt Sulphur and Salt plentifully poured into the Blood; the next fit ſometimes is by this means prevented, not becauſe the Mine of the Diſeaſe is extirpated by Vomit, but becauſe an Evacuation and Motion is excited, contrary to the Feaveriſh motion, and for that reaſon, the ſpontaneous Effervеſcency of the Blood is prevented. Alſo by this means, ſometimes the Diſeaſe is taken away after the Fit, becauſe this way, the Blood is fully cleared from the bilous humor. It is worthy obſervation, that in a Quartan Feaver, Vomits profit nothing, and ſeldom in a Tertian, unleſs adminiſtred preſently at the beginning, whilſt the Feaveriſh diſpoſition is yet light, and not fully confirmed.

Concerning Intermitting Feavers in general, there yet remain ſome Irregulars of them, to be explicated, which vary from the wonted manner: for unleſs theſe unuſual appearances be ſolved, this our Hypotheſis will ſeem to be defective, and to halt in one part. Firſt therefore, they are wont ſometimes to lack the cold or ſhaking fit. This intermitting Feaver is frequent in Autumn, whoſe fits are wont to exerciſe the ſick only with heat. and that moſt violent, and in many they come with great Vomiting, but no Sweat or Cold; then after four or five periods, upon the coming on of the fit, the ſick are wont to be chill, and preſently after to quake, and in the declination to ſweat: The reaſon of this was, becauſe, from the very hot Summer, the conſtitution of the Blood was become ſharp, and very much burnt; wherefore the Particles of the crude Juice, being commixed with it, were preſently torrified, or made hot, and ſcorched; that they did not at firſt, like (new Beer) grow hot with an Acrimony, and then afterwards blaze forth; but a turgeſcency being ſtirred up (like dry wood laid upon a fire) preſently took fire, and broke forth into flames; but afterwards, the Liquor of the Blood being fired by ſeveral fits, became leſs torrid, that the depraved alible Juice was not preſently torrified, but paſſed into a Nitrous matter, and fermenting with ſharpneſs, which at firſt ſwelling up, induced the ſenſe of Cold to the whole Body. When the cold fit was begun, for the moſt part Sweat concluded it: which indeed hapned, becauſe the Blood being made more watery, is more eaſily reſolved into vapour, with the Feaveriſh matter, even as a watery Liquor is more eaſily drawn forth by diſtillation, than what is Oily, or of a more thick conſiſtency.

It often happens, in the declination of this Diſeaſe, when the Fits begin to leſſen, that the ſenſe of Cold and ſhaking, by litle and little are diminiſhed, and at length vaniſh, and the Fit only troubles the ſick with a light burning: The reaſon of which is, becauſe at this time, the Blood being ſomewhat reſtored towards its natural ſtate, begins to concoct and ripen the crude Juice; ſo that a great part of it is aſſimilated: but ſome Excrements being heaped together in the Blood, bring forth as yet a light burning: but when the Feaveriſh Particles do not participate of the Nitrous Acrimony, the Fermentation of the Blood is induced without any ſhivering, by which, what was extraneous, burns forth, is either ſubdued, or carried forth of doors. Sometimes alſo, in the declination of this Diſeaſe, the Fits appear without any burning, only with

with a light cold: The reaſon of which is, becauſe the Morbifick matter, being rather Nitrous, than Sulphureous, when it is in Flux, does ſomewhat blunt the Natural Heat; and by that means is diſſipated, and vaniſhes, without any great deflagration.

There is yet a great doubt concerning the intervals of the periods, which ſometimes ſeem to be double in the ſame Feaver, that the firſt Acceſſion anſwers to the third, and either perhaps comes in the morning; and again the ſecond to the fourth, and both happen in the Evening; and ſo forward: wherefore, the Feaver bearing this figure, is wont to be named a double Tertian, or Quartan, of which it doth not eaſily appear, how they ſhould be done, if the fits depend upon the evil diſpoſition of the Bloud, and from thence on a Congeſtion to a Turgeſcency of the depraved nouriſhing Juice: for which cauſe, they commonly affirm, that this double figure is ſtirred up, or draws its original from a double Neſt, or Mine; but to me it ſeems moſt likely, that in this caſe, ſometimes it happens for the Feaver to be ſimple, and of one kind, alſo its types or figures to be alike, and all congruous one to another, but the error to ariſe, becauſe the interſtitia of the periods, are not computed by hours, but days: For when as, the beginnings of the fits are diſtant one from another, not exactly twenty four hours, but either ſixteen, or thirty hours, in a Quotidian; and in a Tertian, not forty eight, but forty, or fifty ſix, more or leſs, or thereabouts; it comes to paſs, that every other fit, happens before, and the others after Noon. To which alſo may be added, that the different manner of eating, which the ſick uſe very often, produces great inequalities of figures: that ſometimes the fit is redoubled twice in a day, as I have often obſerved in Cachectical men, or full of ill humors, and living diſorderly: but it doth not ſeldom happen, that Intermitting Feavers, repeat fits, which do neither obſerve the ſame diſtance, nor bear altogether the figure of the ſame mode. I have many times obſerved in a Quartan Feaver, that beſides the ſet comings or Acceſſions, returning on the fourth day, about the ſame hour; ſome wandring and uncertain fits, did infeſt the ſick; that ſometimes on the day preceding, the wonted fit, ſometimes on that following it, another fit (tho' lighter) was excited anew, with Shivering, Heat, and Sweat, exactly like the figure of an Intermitting Feaver; and nevertheleſs, the primary Acceſſion returned at its accuſtomed time. This, for the moſt part, is wont to happen, either from Diet evilly inſtituted, chiefly from ſurfeit, and drinking of Wine; or elſe from Medicines wrongfully adminiſtred: The reaſon of which (unleſs I am deceived) conſiſts in this: The Maſs of Bloud, being wont to be filled to a ſwelling up, with the Fermentative matter, at a ſet time, often, by reaſon of ſome errors in eating and drinking, heaps up more matter, than can be eaſily diſſipated in one fit; and when it unequally Cooks the ſame Fermentative matter, it often happens, that it firſt ſhakes off its ſuperfluous, or more thin part, as it were by a certain skirmiſh, in a more light fit, but diſpels the more thick, (after the primary Acceſſion) as yet remaining in the Bloud, by a Feaveriſh Fermentation ariſing anew. And when the fits, in an Intermitting Feaver, redouble after this manner, either become more remiſs, for that tne ſame matter in either, is only divided; and eventilated by two acceſſions. Beſides, when this Fermentative Matter, or Nutritious Juice, depraved in its circulation, is continued, partly in the Arteries and Veins, with the Bloud, and partly in the Nervous ſtock, and ſolid parts, it may happen, that both humors do not ferment at once, but a great part of one may be diſperſed in one fit, and then a great part of the other, in another fit.

Chap. IV.

Of the kinds of Intermitting Feavers; and firſt of a Tertian.

WE ſhall eaſily accommodate to our Hypotheſis, delivered in the former Chapter, concerning the nature and beginning of Intermitting Feavers, all the Phænomena which belong to it, and the reaſons of them. But as thoſe which are of this ſort, do not obſerve the ſame ſpace of Intermiſſion, or of return, and their figures, as to the appearances of their ſigns and ſymptoms, do not altogether happen after the ſame manner; therefore according to the diverſities of theſe, and eſpecially from the diſtance of the fits, the various ſpecies and differences of Intermitting Feavers, are aſſigned. The chiefeſt diviſion of them is, into Tertian, Quotidian, and Quartan: We ſhall here remark the chief things worthy of note concerning each of them.

It is called a Tertian Feaver, not which is accompliſhed at the diſtance of three days; but incluſively from the day in which one Fit begins, from thence the other returns on the third. In the mean time, if the Fits be ſometimes longer, *viz.* protracted almoſt to twenty four hours, and the Remiſſions anticipated alſo by their acceſſions, or comings of the Fits, the ſpace is oftentimes

times leſs by a night and a day. This Diſeaſe is commonly diſtinguiſhed into exquiſite and ſpurious; The exquiſite or exact Tertian Feaver is, which begins with a vehement ſhaking, to which ſucceeds a ſharp and biting heat, which goes off in ſweat, and its Fit is finiſhed in twelve hours, and that the perfect intermiſſion follows; In the ſpurious or baſtard Tertain, the cold and heat are more remiſs, but the Fit is often extended beyond twelve hours, yea, often to eighteen or twenty. Theſe differ as to the various diſpoſition of the Bloud, which is in the former more torrid and ſharp; therefore perverts the alible Juice from Crudity, towards an aduſtion, wherefore a more vehement Effervescency is ſtirred up; but as the matter more equally burns forth, it is ſooner finiſhed. In the latter, beſides the aduſtion, the Blood abounds with too much ſerous humidity, wherefore, the nouriſhing Juice degenerates into a Crude matter, and therefore leſs apt to be overcome, and to burn forth; wherefore, its Fit is gentler, and more unequal, but is not finiſhed but in a longer ſpace.

The Eſſence therefore of a Tertian Feaver conſiſts in this; That the Bloud (like Beer brew'd with too high dry'd Mault) being too ſharp, and torrid, does not rightly ſubdue, and ripen the alible Juice, which is taken in from crude things eaten, but very much perverts it into a nitrous, ſulphureous matter; with which, when the maſs of Bloud is filled to a ſwelling up, like new Beer ſtopp'd up in Bottles, it conceives an heat: From the flux of this nitrous matter, which blunts the heat, and vital ſpirits, and pulls the nervous parts, firſt the cold, with ſhaking is excited; then the vital ſpirit getting ſtrength again, this matter growing hot in the Blood, begins to be ſubdued, and inkindled in the heart; from whoſe deflagration, an intenſe heat is diffuſed through the whole body; then its reliques being ſeparated, and involved with *ſerum*, are ſent away by ſweat.

This torrid Conſtitution of the Bloud, conſiſts in this, That 'tis impregnated more than it ought, with Particles of Sulphur and Salt; wherefore, the Procatartick Cauſes, which diſpoſe to this Diſeaſe, are an hot and bilous temperament, a youthful age, hot diet, as an immoderate uſe of Wine and ſpiced Meats, but eſpecially in the Spring, and autumnal ſeaſons of the year, when the Bloud (as all Vegetables) is apt to flower, and to ferment of its own accord. By reaſon of theſe occaſions, the Liquor of the Bloud, is wont to be throughly roaſted, and to be changed into a cholerick temper: and when it departs from its natural Diſpoſition, ſo much, that it perverts the nutritious Juice, into a matter plainly Fermentative, the beginning of this Feaver is induced; which ſometimes happens from this intemperance, being leiſurely increaſed and brought to the height; but more frequently, an evident cauſe raiſes up this diſpoſition into act, and we aſcribe the origine of this Diſeaſe to ſome notable Accident. Wherefore, lying on the Ground, or taking cold after ſweating, or tranſpiration being any ways hindred; alſo a Surfit, or a perturbation of the Stomach, from any thing inordinately eaten; and laſtly, What things ſoever ſtir up an immoderate heat in the Bloud, bring the lurking diſpoſition of this Diſeaſe into act: for that, from every ſuch occaſion, the nutritious Juice, being heaped in the Blood, and ſomewhat depraved, conceives a Flux, and departing from the reſt of the Bloud, ferments with a nitrous ſharpneſs, then being inkindled and ſhaken by the Spirit, and vital heat, it induces the Fit, with a very ſtrong burning.

A Tertian Feaver, is wont to be more frequent in the Spring, at which time, the Bloud is livelier and richer, and therefore more fitted for this kind of Feaveriſh diſtemper. If this Feaver being taken, be ended within a moderate time, 'tis commonly ſaid to be a Medicine, rather than a Diſeaſe; which is partly true, becauſe, by this means, the impurities of the Bloud burn out, the obſtructions of the Viſcera are diſcharged, and in truth the whole Body is ventilated, ſo that 'tis wholly freed from every excrementitious matter, and the ſeminary of growing Diſeaſes. But if this Diſeaſe be long protracted, it becomes the cauſe of many Sickneſſes, and of a long want of Health. For from hence the maſs of the Bloud is very much deprived of the vital Spirit, and (like Wine too much fermented) in a manner grows lifeleſs: wherefore the Jaundice, Scurvy, or Cachexia, follow this Feaver, being long e'er it be cured. For by its frequent fits, the vital ſpirit very much evaporates, and becauſe it is but little reſtored by things eaten, the Bloud therefore becomes weaker, and almoſt without life: In the mean time, the particles of Salt and Sulphur, are carried forth more, and exalted; from whence, the Bloud is made ſharp, and ſalt, and ſo more unfit for Circulation and Tranſpiration.

Moreover, This Diſeaſe being long protracted, oftentimes changes its Figure, and from a Tertian Feaver, becomes either a Quotidian, or ſometimes a Quartan: then ſometimes from either, it returns into a Tertian. The reaſon of this is, the diſpoſition of the Bloud being variouſly changed: which at firſt being ſharp, and bilous, had perverted the nutritious Juice, by that means, that it ariſe to a fulneſs of ſwelling up on the third day; afterwards, by the frequent Deflagration, becoming leſs ſharp, or in truth more wateriſh, it grows far weaker as to its Conſtitution, ſo that it doth very little, or not at all aſſimulate the nouriſhable humor, and ripen it; and by that means, the increaſe of the Fermentative Matter is made ſooner, and the Fits return daily: or elſe, the Bloud from a ſharp and bilous intemperance, (the conſtitution of the Heaven, or the Year, bringing on this alteration) is changed into an auſtere, or ſaltiſh,

and

and therefore more ſlowly perverts the nouriſhing Juice, and the increaſe of the Feaveriſh Matter, gathering together more ſlowly, it doth not conceive the Fits till on the fourth day: but if either, by the means of Phyſick or Dyet, the temper of the Bloud is reduced from either Dyſcraſie, towards a bilous, the periods alſo are altered, and they reſume the figure of a Tertian.

Certain Symptoms are wont to come upon a Tertian Feaver, which are commonly eſteemed for the Criſis of this Diſeaſe; and in truth ſometimes, theſe appearing, the Diſtemper either clearly ceaſes, or begins to abate of its wonted fierceneſs. But theſe kind of ſigns, are chiefly theſe three, *viz.* The Eryſipelas, or an Eruption of Pimples in the Lips, the Yellow Jaundice, and an Inflammation, or ſwelling ſuddenly excited, in this or that part of the Body: very often there happens after three or four Fits to the ſick, little Ulcers with a cruſty Scab, to break forth about the Lips, and altho' there be no coming away of any Matter, in all the Body beſide, yet from hence they preſage, that the Feaver is about to depart, which ſometimes the event proves true. But indeed ſometimes, I have obſerved, that the hoped for effect has not ſucceeded, but that the Feaver pertinaciouſly, and for a long while hath afflicted them, when their Lips have been broken out. But as to what reſpects this Symptom, it ſeems to ariſe, for that the Bloud having got a more free Diaphoreſis, it not only thruſts forth adoors, the more thin and ſmoaky Recrements, but alſo the more thick; and when the ſame, in other parts more eaſily exhale through the more open Pores, they ſtick in their paſſage about the Lips, by reaſon of the skin being more ſtrictly bound together; and becauſe the vaporous matter abounds in particles of aduſt Salt, and Sulphur, being fixed in the skin, it there hinders Circulation, and therefore induces Puſtles, and little Ulcers; perhaps the more hot breath, which is breathed forth from the mouth, and noſtrils, may contribute ſomething to this Diſtemper, foraſmuch as it ſcorches, and burns the Bloud, and Juices flowing thither: wherefore, it may be ſaid, That this eruption of Puſtles, denotes only a more full Diaphoreſis in the whole, by which, the more thick, as well as the thin Recrements of the aduſt Bloud, evaporate forth of dores. For I have known in ſome, from a Tertian Feaver, little welks like the ſmall Pox to break out in their whole body, that if by this more plentiful Ventilation, as it were a purging, the Blood be ſo freed, that it recovers its priſtine diſpoſition, the Feaver is cured: But if (as ſometimes it happens) ſome Recrements, tho' more thick, break forth, yet others ſtay within, and ſtill cheriſh the Feaveriſh diſpoſition, thoſe little Uleers, argue only a greater taint of the Bloud, and pertinacy of the Diſeaſe, therefore it may be obſerved, when that ſcabs break out in the lips, if the Feaver does not preſently abate, that it will be more grievous and tedious for the future.

Sometimes the yellow Jaundice comes upon a Tertian Feaver, and cures it; (which *Hippocrates* has alſo taken notice of) the reaſon of which is, becauſe, when the Bloud has got a ſharp or bilous diſpoſition; that therefore it had perverted the alible Juice, and from thence had heaped together excrementitious matter, it is oftentimes freed by that Dyſcraſie, when by a ſudden Secretion, the recrements of aduſt Salt and Sulphur, are more plentiful purged forth. This the Choleduct Veſſels being irritated by Phyſick, or of their own accord, and ſo pouring out plentifully the Bile, from the Bloud, do often perform: becauſe Vomiting, Purging, and eſpecially a Diarrhea or Lask, very much conduce to the Cure of this Diſeaſe, yea ſometimes, the Bloud it ſelf, putting forth of its own accord, thruſts forth the bilous recrements, at its off-ſcourings, and in the circulating puts them forth in the skin, and ſo inducing the yellow Jaundice, cures this Feaver.

When an Inflammation, (as ſometimes 'tis wont) comes upon this Diſtemper, the Ague is commonly ſaid to fall down into the part diſtempered with the Tumor. But that by ſuch a breaking forth, this Diſeaſe is cured, 'tis no wonder; becauſe the Bloud by this means continually lays aſide out of his boſom, the proviſion of the degenerate nutritious Juice, and transfers it to the diſtempered part; and therefore, the degenerate and fermentative matter in the maſs of Blood, does not eaſily ariſe to a fulneſs of ſwelling up: wherefore, the Belly being perpetually looſe, hath by degrees helped ſome, for that the Blood by this means, readily caſts forth its burthen, now growing low, and not having a more full increaſe yielded to it: ſometimes alſo, a Deafneſs ſuddenly ariſing, the Tertian Feaver has preſently ceaſed, to wit, by reaſon of a continual tranſlation of the Feaveriſh Matter, from the boſom of the Bloud, into the head.

If that the Tertian Feaver, within a ſhort time, neither by the free accord of Nature, declines by degrees, that it doth clearly ceaſe within ſeven or ten periods, nor is cured by any of the aforeſaid means, nor is removed by the help of Medicine, but that after ten or twelve fits, the ſick are ſtill grievouſly afflicted, it will be a very hard task to cure it: becauſe the Bloud, from the continual heaping of the Feaveriſh matter, and by the frequent burnings, becomes at length ſo depraved, that it concocts nothing truly for the nouriſhment of the body, and for the ſuſtaining its ſtrength; neither is it able to ſhake throughly out of its boſom, the impurities and excrements, whereby the Diſeaſe may make a Criſis or ſeparation, but in truth, the ſame growing in ſtrength every day, the Blood, beſides its Dyſcraſie or evil diſpoſition, begins to be

hurt ſomewhat in its mixture; wherefore, more frequent fits infeſt them, nor does a perfect Remiſſion come between, but that the ſick being very weak and languiſhing, are almoſt continually Feaveriſh, with thirſt and heat: when it is come to this paſs, unleſs they are ſuccour'd by remedies from Art, or that the change of the Place, and Air, bring timely help, this Diſeaſe often ends in death.

As to its Cure: the method of healing is commonly directed to this one ſcope, to wit, that the mine of the Diſeaſe may be extirpated, and that the Feaveriſh matter may be eradicated out of our Body, without any cheriſher remaining, or fear of relapſing; wherefore Vomits and Purges are diligently inſtituted, which when profiting nothing to the cure, but that the Patients ſtrength is very much broken, the ſick are left by the Phyſicians, and the buſineſs is wholly committed to Nature. The Intentions (as it ſeems to me) ought to be of this ſort: Firſt, a reſtitution of the Bloud, to its natural Temper. Secondly, a prevention of the depravation of the nouriſhing Juice, as much as may be. Thirdly, an Inhibition of the Feaveriſh Fermentation, that the fit may not be excited. And theſe Indications take place, not only in a Tertian Feaver, but in any other intermitting Feaver beſides: which yet are to be performed, not by the ſame ways and remedies, but by ſeveral, according to the diverſity of the Diſeaſe, of the condition of the ſick, and of the ſymptoms chiefly urging. However in the curing of this Diſeaſe, there is more to be attributed to Nature, and to a good order of Diet, or way of Living, than to Phyſick.

1. Concerning the firſt Intention; to wit, that the Bloud may be reduced to its natural Temper, Vomits, letting of Bloud, and Purging are of great uſe: eſpecially, if they be celebrated in the beginning of the Diſeaſe. *Vomitories* help, both for that they purge the Ventricle, that the firſt Concoction may be better performed, and by that means the nouriſhing Chyme may be more purely ſupplied, for matter of the Bloud; but chiefly, for that by plentifully preſſing forth the Bile, from the Choleduct paſſage, they empty the Galliſh bag, as by that means, the Bile is poured forth more full from the maſs of Bloud; and ſo the Bloud is purified, from the recrements of aduſt Salt and Sulphur. The opening of a Vein, cools and ventilates the Blood, as by that means, 'tis leſs torrified, or ſcorched, and is circulated more freely in the Veſſels, without danger of burning. Alſo Purging plentifully draws forth, and by provoking expreſſes, or ſqueezes out, the Bile, from the galliſh Veſſels, and conſequently from the maſs of Blood. For this end, (to wit, the reduction of the Bloud) Digeſtives bring help, the more temperate Vinegars, or Acetous things, foraſmuch as they fuſe, and alter the Bloud, and do attemper its fervor. Sometimes alſo, the change of the Soil, and Air, notably amends the evil conſtitution of the Blood, before all other Remedies whatſoever.

The ſecond Intention, is excellently performed, by Diet, and an exact manner of living; which in this Diſeaſe ought to be ſlender and ſparing: wherefore it is commonly ſaid, Starving is the beſt Remedy for this Diſeaſe: and it appears by common experience, that by a more ſpare eating, the coming of the Ague fit, is very often prolonged, beyond its wonted cuſtom. There are eſpecially two things to be obſerved, concerning Eating and Drinking: The firſt, that the food be ſlender, that nothing Sulphureous or Spirituous be given, for ſo the Conflagration of the Bloud will be leſſened; then ſecondly, that the fit approaching, or urging, nothing of Aliment be taken, wherefore, in faſting the fit is lighter, and ſooner finiſhed.

As to the third thing propoſed; the Inhibition of the Feaveriſh fit, is inſtituted by Remedies, which ſtay the Fermentation of the Bloud. But tho' this Remedy ſeems Empirical, and unmethodical, and very failable to Phyſicians, yet I have found theſe Feavers to be very often cured by this means, when Medicines have profited nothing: What they are, and by what means, without the ſuſpicion of Witchcraft, they afford help, for the curing this Diſeaſe, is before noted. We ſhall here only advertiſe you, that the uſe of theſe is moſt profitable after Phyſick, and opening a Vein, if there be need of it; and unleſs theſe be rightly performed before-hand, thoſe other rarely ſtop the fit. But Vomiting, Purging, and breathing a Vein, unleſs they be preſently celebrated after the beginning, yield little help, yea, more often are wont to hinder: For whilſt the Bloud is ſtrong in vital ſpirit, its evil diſpoſition, may with eaſie labour be corrected, or amended: wherefore if the Bile, about the beginning, be copiouſly drawn forth, or the Bloud eventilated, it is reduced to its natural Complexion; but afterwards, in the progreſs of this Diſeaſe (the Spirit being now very much exhauſted, and the Salt and Sulphur too much exalted) if theſe kind of Evacuations be adminiſtred, they do more debilitate the diſpoſition of the Blood: and therefore it is clear by obſervation, that the Tertian Feaver, is rarely or never cured, by theſe Remedies late adminiſtred, and often paſſes into a Quotidian. I my ſelf have known ſome, in the Spring time, being ſtrong in very good health, from a more ſtrong Emetick taken for prevention ſake, cauſing a violence by the Evacuation, to have preſently fallen into a Tertian Feaver; and others, for ſome time cured of this Feaver, when they had taken a ſtrong Purge, for the carrying away of the remains of the Feaveriſh matter, upon it to have fallen into a Relapſe. It may be readily ſaid, that the mine of the Diſeaſe, being before at quiet, was ſtirred up, and brought into Act, after this manner by the Medicine: But if you conſider this thing rightly,

rightly, it may rather be ſaid, that from the ſtrong Medicine, the diſpoſition of the Bloud was very much hurt, and when at firſt it was prone to a bilous Dyſcraſie, that it hardly did aſſimilate the alible Juice, from this evident cauſe, it forthwith degenerated, that it wholly perverted the Nutriment, into a Fermentative matter, and ſo conceived the Feaveriſh diſpoſition. It is a common opinion, that a Tertian Feaver can ſcarce be cured, without a Vomit, wherefore ſome Medicaſters, are wont under the pretext of the neceſſity, to give to all whatſoever, labouring with this diſeaſe (though languiſhing and weak) an Emetick Medecine not without great danger of life: and thoſe whom they judge wholly unfit for ſuch a Medecine, they leave as not eaſily curable, to Nature. But (as I have often found the contrary by experience) this ſort of practice is evilly inſtituted; yea, I rather judge, for the curing of a Tertian Feaver, that Vomits are rarely or never to be required, unleſs in a ſtrong Body, and very eaſily prone to vomiting, and when the Ventricle happens to be burdened with excrementitious matter; but inſtead of it, that a gentle Purge, by which the load of the humors may be pleaſantly brought away, may be of better uſe; becauſe a Purge in this caſe, doth the ſame thing as a Vomit, to wit, it evacuates the Choleduct Veſſels, that the Bile being plentifully exhauſted from the Blood, the Feaveriſh Dyſcraſie is mended. But when the galliſh humor, being emptied forth into the Ventricle, is caſt out upwards, from thence there is great hurt brought to the Stomach, and a mighty perturbation excited in the whole Body: But if that humor be enticed downwards by a gentle Purge, it is ſent forth of doors without any trouble. Then, if to a gentle Purge, once or twice repeated, be added a very ſlender Diet, without fleſh, it often anſwers the preſervatory Indication, that there needs no other Remedies, for the taking away the cauſe of this Diſeaſe; but that theſe being rightly performed, ſhall render beneficial thoſe things, which being either inwardly taken, or outwardly applied, ſtop the Feaveriſh acceſſion. By this ſort of plain and eaſie inſtitution of Medicine, *viz.* A Purge of the infuſion of Senna, and Rhubarb, a ſlender Diet, and a Febrifuge or Ague-reſiſting Topick, laid either to the Wriſts, or the Breaſt, I have known vey often, and in a very ſhort time, Tertian Feavers cured, without the uſe of any other deſtroying Phyſick; yea, a thin Diet only, with Amulets timely adminiſtred, hath very happily cured Big-belli'd women, and alſo very weak old men, whoſe ſtrength could not bear Purging. I have ſo often made trial of this method, with good ſucceſs, that I doubt not, but that a Tertian Feaver may as eaſily be cured, as any other Diſeaſe, if it be at the beginning handled after this manner, *viz.* before the temper of the Blood be more hurt, by an evil manner of Diet, or by Medicine untowardly adminiſtred. For the truth of this thing I will relate this following Hiſtory.

A certain Noble young man, indued with a bilous temper, had caught an intermitting Tertian Feaver; upon the approach of the Fit, he vomited forth much yellow and greeniſh Choler, then he was troubled moſt grievouſly, for many hours, with a great pain of the Heart, and moſt ſtrong Heat and Thirſt. On the day of the Intermiſſion there was taken from this perſon, with whom I was by chance, by my preſcription, eight ounces of Blood, and in the Afternoon was given an Emollient Clyſter, he alſo uſed a moſt ſlender Diet (*viz.* only made of Barly) He took every night going to ſleep, this Opiate, *viz.* Conſerve of Roſes vitriolated, half a dram, of Diaſcordium a ſcruple, alſo every morning of the Salt of Wormwood a ſcruple, in a ſpoonful of the Juice of Orange; but when theſe did not ſucceed (for the fit returned ſomewhat more remiſs, but with cruel Vomiting, as at firſt,) beſides, for that this ſick perſon extreamly abhorr'd a Vomitory Medecine (becauſe not long before this, from a very gentle Emetick, he had vomited almoſt thirty times, until being diſtempered with the Cramp and Convulſions, he was brought into great weakneſs, with hazard of his Life) therefore, the day following the aforeſaid Fit, I gave him a Potion of an infuſion of Senna, Rhubarb, and yellow Sanders, with Salt of Wormwood, in Spring-water, by which he was purged ten times with eaſe: In the Morning after, and three hours before he expected the Fit, I put to his wriſts an Ague-reſiſting Medecine, and took from him ſix ounces of Blood, by which means he miſt his Feaveriſh Fit, and then being again purged after the ſame manner, became perfectly well.

If that the Tertian Feaver, by reaſon of the evil Conſtitution of the ſick, or becauſe of Errors in Diet, or committed by Phyſick, hath more deeply rooted it ſelf, that after a long Sickneſs, the Fits ſtill grow worſe, and the ſick extreamly languiſh, with want of Strength, Thirſt, and almoſt continual Heat, want of Appetite, Wakings, weak Pulſe, high-coloured Urine, and very full of Contents, the Curatory Method ought to be a little otherwiſe inſtituted; In this caſe, firſt it is to be endeavoured, that the Dyſcraſie of the Blood may be taken away; wherefore the ſick are to be fed with ſlender Aliments only, as Barly-Broth, or Grewel, with opening Roots boiled in it (fleſh-Broth being wholly laid aſide) the Belly is to be kept looſe (if need be) with the uſe of emollient Clyſters, beſides (Purges being omitted) only Digeſtive Medecines, which fuſe the Blood, and bring away gently the ſerous Impurities by Urine, alſo comforting Remedies, which corroborate the Viſcera, and cheriſh the Spirits, are chiefly to be inſiſted on. To this end, Apozems are fitly to be prepared, of Herbs, and Roots gently Diuretic; alſo Opiats help very much, of temperate Conſerves, with Sal Nitre, or

the fixed Salt of Herbs, with ſhelly Powders, and the Spirit of Vitriol mixed together. When the diſpoſition of the Blood is ſomewhat mended, that the Urine is clearer, and leſs coloured, alſo ſleep quieter, with a remiſſion of thirſt, and heat following, then may be profitably adminiſtred Remedies to ſtop the Feaveriſh Fit: wherefore Ague-reſiſting Amulets may be applied to the Wriſts or to the Soles of the Feet; alſo the Powder of Peruvian Bark, or of ſomething inſtead of it, or alſo of the Barks of the Aſh-Tree, Tamarisk, or Gentian, with Salts mixed with them, and drunk in white Wine; after the comings of the Fits are taken away, and the ſick begin to get ſtrength, and deſire food, and in ſome meaſure to digeſt it, gentle Purges may be of uſe; but let the ſick ſtill abſtain from a more plentiful Diet, or participating of Fleſh, and they will ſhortly after recover perfect Health without any violent Purge or Phlebotomy.

CHAP. V.

Of the Quotidian Intermitting Feaver.

BEcauſe of its Affinity to the Tertian Feaver, and likeneſs of Fits, the Quotidian (or daily) Feaver comes next, *viz.* whoſe Acceſſion is wont to return every day. It is the Opinion of ſome, that this ſort of Feaver is only a double Tertian, and doth ariſe from a diſperſed matter, having gotten a twofold Neſt; to which I cannot aſſent; and I ſuppoſe its beginning is to be attributed to a peculiar Dyſcraſie of the Blood. In this the Symptoms of Cold and Heat are more remiſs, but its fit is longer continued, and oftentimes it is wont to laſt eighteen or twenty hours: This Feaver for the moſt part follows a Tertian; for when the Vital Spirit is very much flown away, by the frequent deflagration of the Blood, and (the Feaveriſh diſpoſition ſtill remaining) the Blood is made weaker, it doth not concoct the nouriſhing Juice, or ripen it, but perverts almoſt the whole into a fermentative matter; wherefore its comes ſooner to its increaſe, and is gathered together to a plenitude of ſwelling up, within double the time, than at firſt. But becauſe the congeſted matter participates equally of crudity and aduſtion, therefore the heat of the burning is leſſer, and more unequal, and (like green wood laid on the fire) ſlowly burns; for which reaſon the Fit endures longer.

Sometimes it happens, that a Quotidian Feaver, doth ariſe without a Tertian going before, *viz.* when a Feaveriſh diſpoſition falls upon a Cacochymic Body, or full of evil humors, and ſtuffed with depraved Juices; for then the Blood, being poor in Spirits, perverts in a greater meaſure the nutritious Juice, and in a ſhorter time gathers to a fulneſs of ſwelling up: But that which begins an every days Ague, oftentimes changes its figure, and becomes a Tertian; juſt as a Tertian often goes into a Quotidian, becauſe between theſe Feavers, and their Cauſes, there is a great vicinity; and the conſtitution of the Blood being a little changed, it makes a tranſition from one to another. A Quotidian Intermitting Feaver is not ſo eaſily cured as a Tertian: For whether it comes at firſt ſimple, or follows upon another intermitting Feaver, it is ſtill excited from a ſtronger cauſe, and argues a greater dyſcraſie of the Blood, which will not preſently give way to Remedies. But alſo, if this Feaver be of long continuance, or comes upon another Chronical Diſeaſe, it has moſt often adjoyned to it, beſides the taint of the Blood, the infirmities of the Inwards: to wit, the Blood being ſpoiled, eaſily affixeth its impurities by degrees heaped up, on the Viſcera, whilſt it paſſes through their Meanders: from hence it is, that in a Quotidian Feaver, the weight of the Ventricle, an extenſion of the Hyponchondria, Obſtructions, or Tumors, now of the Liver, now of the Spleen, or Meſentery, are joyned together; but theſe kind of Diſtempers, are not the cauſe of the Feaver (as is commonly believed) but only its product. Wherefore, in this Feaver, beſides the ſimple method of Cure, which is ſhewn in the Tertian, many other intentions or coindications, come under conſideration: to wit, that the Ventricle be cleanſed from its load of humors, the ſtuffings of the Inwards freed, Infirmities corroborated; and that together with theſe, the Dyſcraſie of the Blood may be mended, and the Acceſſions of the Feaver may be reſtrained, muſt by all means be endeavoured; from whence, by reaſon of theſe kind of various intentions, we come to the Cure by a longer way: In this caſe, Vomits (if ſtrength will bear them) are of benefit before all other Medecines: alſo Purges, whereby the aſſiduous ſupply of Excrementitious matter may be drawn forth, are often to be repeated: Beſides theſe, Digeſtive Remedies, Openers of Obſtructions, ſuch as reſtore the Ferment of the Viſcera and Blood, and correct their evil diſpoſitions, are frequently to be adminiſtred. Wherefore, the fixed Salts of Herbs, and their Extracts, Acid Spirits of Minerals, and ſometimes Preparations of Steel, do very much help: concerning theſe main

main things, the Task will be hard, when by reaſon of the manifold evil, many things are to be done together, yet by reaſon of the aſſiduity of the Feaveriſh fit, there is leiſure for the ſick to uſe few only. In Diſtempers ſo complicated, though the reaſon of the Method requires the impediments to be firſt removed, and then to cure the Diſeaſe, yet I have known this kind of Feaver, beſet with many other Diſtempers, in a Body full of Humors, often cured, without Method, and by an Empirical way, *viz.* after a light proviſion of the whole, Ague-reſiſting Remedies being outwardly applied, have at firſt ſtopped the Feaveriſh Fit, that then there was time, for the curing the other Diſtempers, and more happy occaſions of healing were granted. I lately viſited a Noble Lady, who being long indued with a Cachectical habit of Body, a Month after her Lying in, being weak and languiſhing, was taken with a Quotidian Intermitting Feaver; after ſix or ſeven fits of it, her ſtrength was ſo much caſt down, that ſhe could ſcarce riſe out of, or ſit up in her Bed; nor able to take never ſo little Food, though very ſlender, but upon it, moſt grievous moleſtations were raiſed up in her Stomach; beſides, the Region of her Ventricle, and left Hypochondrium, was wholly beſet, with a hard ſhining tumor, and cruelly painful, by reaſon of her ſtrength being mightily caſt down, there was no place left for Evacuation, but the uſe of Clyſters; alſo her Stomach being very weak, loathed all other Remedies, unleſs very grateful, and only in a very ſmall quantity. In this difficult caſe, circumſcribed between narrow limits of Curing, I counſelled theſe few things, to wit, that twice in day, ſhe ſhould take this mixture, *viz.* The Magiſterial Water of Earth-worms two ounces, of Elixir Proprietatis twelve drops. Moreover, I ordered to be applied to her Ventricle, a Fomentation, of the Leaves of Sea-Wormwood, Centaury, Southernwood, with the Roots of Gentian, boiled in White-Wine, in an open Veſſel: alſo, that after the Fomentation, a Cake of Toſted Bread, and dipped in the ſame Liquor, ſhould be worn upon her Stomach; beſides, Ague-reſiſting Medicines were ordered for her wriſts; and with theſe Remedies only, ſhe miſt her Ague-Fit, on the third day, and remained free from it afterwards; then by the Uſe of Chalybeat Remedies, ſhe became perfectly well, within a ſhort time.

Chap. VI.

Of a Quartan Feaver.

In a Quartan Feaver, the period is longer than in the reſt; to wit, which is extended to the fourth day incluſively; alſo its continuance uſes to be longer, and its cure harder: becauſe this Diſeaſe is protracted for many Months, yea, oftentimes for years, and ſeldom, or ſcarce at all, is cured by Medecines.

The Fit, for the moſt part, begins with cold and ſhaking, to which a very troubleſom heat ſucceeds, but more remiſs than in a Tertian: Sweat for the moſt part concludes the Fit. At the firſt coming of the Diſeaſe, the Fits are more grievous, and very infeſtous, and keep the ſick in their Beds; yea, they make them loſe their ſtrength, and vigor of Body: But afterwards, the trouble is more eaſily born, ſo that the fits are ſuffered out of bed, and ſometimes in a Journey, or being about any buſineſs. If it continue long, it induces the Scurvy, or Hypochondriac Diſtemper, and involves men in an unhealthful condition.

The Cauſes which diſpoſe to this Diſeaſe, are firſt, the Conſtituion of the Soil and Air, becauſe this Diſtemper is proper to the Fall of the Leaf, or Autumn, that you rarely find this Feaver to begin but about that time: alſo in ſome places, eſpecially about the Sea-coaſts, this uſes to be general, or common to the Region, and to come upon thoſe living there, or Strangers coming thither from elſewhere. A declining Age, which is paſt its Achme or height, alſo a Melancholick Temper, and which, by reaſon of an ill manner of living, is obnoxious to the Hypochondriac Diſtemper, cauſe this: beſides, long Feavers of another kind, and Chronical Diſeaſes, often paſs into a Quartan Feaver.

According to theſe Poſitions, and rightly weighed, it may be ſaid, that a Quartan Feaver, even as the other intermitting Feavers, depends upon a vicious diſpoſition of the Blood; to wit, becauſe the nutritious Juice, being by degrees dilated into the Veſſels, is perverted into a a fermentative matter; and the effervеſcency of this, heaped up even to fulneſs of ſwelling over, conſtitutes the Fit of the Quartan Feaver. But as in this Feaver, there are ſome things, which are peculiar from the reſt, we will enquire what kind of Dyſcraſie of the Blood it is in this Diſeaſe, diſtinct from the others, and by what means it excites the very remarkable Symptoms.

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The Opinion which is commonly had concerning this thing, is very far from Truth; almoſt by the conſent of all, the Eſſence and beginning of a Quartan Feaver, is aſcribed to a Melancholic humor, heaped up ſomewhere in the firſt paſſages, and there periodically putrifying. Inſtead of this, we affirm, that in this Diſeaſe, the Liquor of the Blood doth paſs from a ſweet, ſpirituous, and balſamick, into an acid, and ſomewhat auſtere nature, like Wine growing ſowr; to wit, there is too great a want of Spirits, and the Terreſtrial, or Tartareous part of the Blood (which conſiſts chiefly of Salt and Earth) is too much exalted, and being carried forth into a Flux, induces the ſourneſs of the maſs of Blood. Even as Beer being diſturbed by Thunder, and infected with a troubled Lee or Dregs, grow ſowr. The Blood, after this manner degenerated from its native diſpoſition, doth not rightly dreſs the alible Juice, and aſſimilate it to it ſelf, but perverts it into an extraneous matter; with which, when it is ſatisfied to a fulneſs, in the Veſſels, and the nervous parts are watered by the Juice, from thence ariſing, a Flux of this matter, and as it were a ſpontaneous effervescency follows, by which indeed, the Feaveriſh fit is induced, with ſhivering and heat, as is wont to be in a Tertian.

In a Quartan Feaver, the periods have longer intervals, becauſe, when the Dyſcraſie of the Blood is become ſowriſh, and therefore leſs violent and hot, it perverts the alible Juice without ſtrife or tumult: wherefore, it aſſimilates ſome of it, and the depravation of the reſt, does not ſo far recede from its natural ſtate, as in a Tertian; and from hence its congeſtion to a plenitude, is made longer, and almoſt in another half of that time, in which a Tertian riſes up to a Turgeſcency: And therefore, thoſe taken with this Feaver, are indifferently well, and are ſtrong; which is a ſign, that the nutritious Juice is leſs depraved; alſo the Fits are made without cruel burning, becauſe the nutritious humor is perverted into a fermentative matter, without great aduſtion.

But why this Diſeaſe is ſo hard to be cured, and ſo pertinaciouſly infeſts the ſick, the cauſe is, the Melancholic Conſtitution of the Blood, which is not eaſily to be taken away, and yields almoſt to no Remedies. The Cholerick diſpoſition of the Blood is mended by the frequent Deflagration, and ceaſes often of its own accord, even as too rich Wines are depreſſed by their own growing hot, and are wont to be reduced into their due ſtate; but this Melancholick Dyſcraſie of the Blood, in which, with a want and defect of Spirits, Salt and Earth are too much exalted (as when Wines grow ſowr) is moſt hard to be reſtored, and is almoſt of the ſame labour and difficulty, as to put again Life, and a Vinous Spirit into Vinegar: For that the Blood, depraved after this manner, may be reſtored, it will be needful, that its whole maſs ſhould be volatilized, and as it were made Spiritual anew: wherefore, in this caſe, Evacuations profit not a jot; yea, by more depauperating the Blood, oftentimes the ſtrength is caſt down, beyond help: but they had need to exalt, and make volatile what is fixed, and to promote a Tranſpiration, or Spiritualization in the whole Maſs of Blood: From hence it is, that in this Diſeaſe, the change of the Air and Region, moſt often brings help, before all other Remedies; for the Spring following oftentimes takes away thoſe Quartan Feavers that had ariſen the Autumn before; which without doubt happens, becauſe the changed condition of the Air is wont to alter for the better, the evil diſpoſition of the Blood: alſo for the ſame reaſon, the change of the place, moſt often cures this Diſtemper, inexpugnable to all Phyſick.

If it be demanded, wherefore this Diſeaſe chiefly begins in the Autumn, and rarely in the Spring, or Summer time; I ſay, the Autumnal time doth moſt fitly produce this kind of Feaveriſh diſpoſition of the Blood; for when very much of the Spirit and Sulphur hath flown away by the Summers heat, and that what is left begins to be bound up by the Cold; the Liquor of the Blood (as Wine growing ſowr by too much heat) eaſily degenerates into a ſaltiſh, and acidulous or ſharp Nature: This alſo, the Sea-Air, by infecting the Blood and Spirits with Saline Vapours falling on them, eaſily procures: yea, alſo the affinity of this Diſeaſe, with the Scurvy and Hypochondriac Diſtemper, plainly ſhews, the evil diſpoſition of the Blood to be in fault, whereby it becomes ſalt, and earthy, with the want of Spirit.

Concerning Quartan Feavers, the laſt year was ſo abundantly fruitful of Obſervations, that many might collect by ocular inſpection, whatever belong to this Diſeaſe; for when the moſt hot Summer was paſt, about the end of it an Epidemical Feaver (of which in another place you ſhall have a deſcription) followed; then the Autumn coming on, when that Diſeaſe had ceaſed, a Quartan Feaver began very much to rage; that in very many places the fourth part of the People was taken with it: neither did it only infeſt old men, ſplenetick and melancholick men, but of every Age and Temper, alſo Infants, Children, and young Men ordinarily; which was clearly a ſign, that this Diſtemper had drawn its Riſe, not from a Melancholick Humor, heaped up, by the default of the Spleen, but from the Dyſcraſie of the Blood, brought in, through the intemperance of the Year; for the Maſs of Blood, after too great heats, even as Wines after immoderate effervescencies, was made fit to grow ſomewhat ſowr, or to get an auſtere diſpoſition, and ſo alſo prone to this ſort of Feaver, as is already ſhewn.

If the Remedies, which for the curing of this, have been made trial of, both by Phyſicians and Empiricks, were collected together, their deſcription would ſwell into a great Volume; but

but although there is inſtituted a manifold proviſion of Medecine, againſt this Evil, yet very few are cured in the Autumn. In ſome, about the beginning of their ſickneſs, before the Diſeaſe has taken too deep root, a Vomit hath brought help; but in moſt, all manner of Catharticks, tho' an hundred times repeated, have profited nothing. In whom the evil had deeply implanted it ſelf, the ſick received no help, from the moſt ſtudied Medicines made uſe of all the Autumn. But when at this time, I perceived the ordinary method of Medicine, was adminiſtred in vain, I propoſed to a Noble Virgin, requiring a ſudden Cure, by any means, to be performed, that if ſhe would indure a Flux at the Mouth, for ſome days, from a Mineral Medicine, by that means, it might be hoped, that the Diſeaſe would be profligated. When ſhe had readily aſſented to this, I gave her a gentle, and very ſafe Medicine, by which a light ſpitting only was provoked, and that finiſhed within twelve days: As ſoon as the Salivation began, ſhe miſt her fits, but at thoſe times they were wont to come, ſhe felt a perturbation in her whole Body, with an oppreſſion of the Heart, and dread of ſwooning, but after the ſpitting was finiſhed, ſhe appear'd very well; and when again after two months ſpace, ſhe was troubled with ſome light fits of this Diſeaſe, from an Emetick Powder, twice or thrice taken, ſhe was wholly cured without relapſing.

After the winter Solſtice, this Diſeaſe began to rage leſs, and to ceaſe in ſome of its own accord, and in many others, to be eaſily expung'd by the uſe of Phyſick: becauſe at this time, the Dyſcraſie of the Blood, contracted by the Summers heat, is wont to be blotted out leiſurely, by reaſon of the cold of the Winter, and the maſs of Bloud growing old, as it were to put off its old ſpoils, and to be reduced towards its natural ſtate. But thoſe who were of a melancholick temper, or had their Viſcera, and eſpecially the Spleen, evilly affected, or that uſed an ill manner of Diet, received no change at this Tropick, but to the next period of the year, *viz.* to the vernal Equinox, or the Spring, kept the Diſeaſe; and then in moſt, the Blood being either reſtored of it ſelf, or its intemperance more eaſily mended by the uſe of Remedies, this Diſtemper was ſeen to be overcome: But in the mean time, many old men, and ſuch as were full of evil humors, or otherways unhealthy, ordinarily died, in all that ſpace of time, of this Diſeaſe; alſo ſome liv'd, who could not ſhake off its yoak, tho' the Summer Solſtice were paſt. But altho' very many had labour'd with this Feaver, as it were Epidemical, almoſt through the whole year, yet none (that I know) contracted it firſt in the Spring, and very few grew well of it during the Autumn, that in truth, I do not doubt, the Dyſcraſie of the Bloud, to be the cauſe of this, and the cure to conſiſt in the change of it.

The Remedies, which moſt often brought help, (as appeared at leaſt to our obſervation) were of this ſort, which did reſtrain the Feaveriſh fit: for the evils of the diſpoſition of the Bloud, being ſomewhat mended, by the time of the year, being changed, if now the habitual cuſtom of the fits were broken off, Nature recollected her ſelf, and eaſily recover'd the priſtine ſtate of health, by her own endeavour. And this kind of intention, (to wit, the inhibition of the fits) though ſometimes performed by Vomits, given a little before the coming of the fit, (for theſe did not rarely ſtop the Feaveriſh motion of the Bloud, by raiſing up another motion contrary to this) yet this Indication is far more certainly, and indeed happily effected, by the uſe of thoſe kind of Medicines, which do not altogether evacuate from the Viſcera, but induce, either a certain fixation to the Blood, or a precipitation of the Feaveriſh matter, for a time. Wherefore, thoſe whom I undertook to cure in the Spring, and afterwards; I handled (and in moſt with good ſucceſs) with this method; a proviſion being made of the whole, ſometimes with an Emetic Medicine, ſometimes with a Solutive; I was wont three hours before the fit, to lay a peculiar Ague-Medicine to the wriſts, and together, to give them to drink in Sack, an Ague-reſiſting Powder, and to order the ſick to be kept in a Bed in a gentle ſweat: It ſeldom hapned, but at the firſt, or ſecond time, the Feaveriſh fit, was by this means reſtrained, and then, by the ſame Remedy, ſometimes reiterated, the Diſeaſe at laſt wholly ceaſed. To this kind of practice, (beſides our experience) the uſe of the Powder, of a certain Bark, brought of late from the *Indies*, ſeems to give ſome faith, and approbation; which is ſaid, moſt certainly, to cure this Diſeaſe; but the vertue, or operation of this, without any evacuation, conſiſts in this only, that it hinders the coming of the Feaveriſh fits.

Concerning this Peruvian Bark, becauſe of late it hath begun to be in uſe, there are ſome things to be ſaid, which offer themſelves to common obſervation. The common manner of exhibiting this is, that two drams of it beaten to powder, be infuſed in Sack, or White-wine, in an open Glaſs, for two hours, and then upon the coming of the fit, the Patient being put to Bed, that the Liquor and Powder be drunk up. This Potion often takes away the approaching fit, yet oftentimes tho' taken after the wonted manner, it prevents the next, however, either in the firſt, ſecond, or third period, the fit is inhibited, and the Diſeaſe ſeems to be cured, it is often wont to return, within twenty or thirty days; then this Powder being again exhibited, the Diſeaſe is for a time deferred about the ſame ſpace, and by this means, I have known many ſick of a Quartan, to have ſuffered ſome few fits only, a whole Autumn, and Winter, and ſo to have detained the enemy in his precincts, till the Spring coming on, the diſpoſition of the Bloud is altered for the better,

better, by the help of the time of year, and of other Physick, and so this distemper vanishes by degrees. Those who by this means, have procured these frequent truces of the Quartan, have liv'd chearful, lively, and ready for any business, when otherwise, being weak, and pale, they were brought into languishment, and a vitious habit of body: scarce one of an hundred, hath tryed this Medicine in vain, yea, if but half, or a lesser quantity, *viz.* the weight of but one dram, taken, it very often takes away the fits, and suspends the same, a shorter space only; neither is it any matter, whether it be taken in strong, or small Wine, unless with the respect, to the disposition of the sick: because in a more hot temper, it may be profitably taken in distilled Water, or Whey; also, a clear infusion of it, the more thick substance being cast away, produces the like effect, but of shorter durance: I have taken care to reduce this Powder into Pills, with the Mucilage of Tragacanth, with a little cost to the sick, to be given to some; after what manner soever it is taken, unless to those loathing and abhorring every Medicine, it causes no manifest evacuation, and takes away the fit, almost from all; neither is it only in a Quartan Feaver, but in the other kinds of intermitting Feavers, to wit, in every one where there is any remission coming between, given with good success. It is commonly ordered, that a gentle Purge should be taken before this, but in some who are very weak, and keep their Beds, this Powder being taken carefully, without any previous Medicine, hath procured laudable effects. In the mean time, I will ingeniously confess, that I have not seen an intermitting Feaver quite cured, by this Bark, once taken: nay, rather the fits not only of a Quartan, but of a Tertian, and Quotidian Feaver, wholly overcome easily by other Remedies, seeming to be driven away by this Powder, have constantly return'd after a short time. For this Reason, they who suppress intermitting Feavers, otherways easily curable, no necessity urging them, by this Medicine, for a little while, only seem to institute a deceitful Medicine, and do no more than those, who skin over a rotten Ulcer, which will shortly break out again; in truth, in some cases, the use of this will be requisite, *viz.* when by the too great assiduity of the fits, the spirits of the sick are cast down, truces are by this means procured, by which Nature may recollect her self, and afterwards may be more able to fight against this potent Enemy: also, that a Quartan Feaver, during the Autumn and Winter, may pass over with little trouble, this Bark is profitably administred: But those, who expect a longer resting time, from the assaults of this Feaver, are bid to take this Powder in greater quantity, and more often, to wit, that they should take two drams, three several times one after another, whether the fits return or no; by this means, they remain longer free, yet they retain within, the Enemy still, tho' asleep.

If it be demanded, concerning the Nature of this Bark, and the vertue in suppressing the fits of Intermitting Feavers, it is not to be dissembled, that 'tis very difficult to explicate the causes of these kind of effects, and the manner of working; because there is not found as yet in any Subject, besides, the like efficacy; but from a singular Experiment, a general Reason is not to be rightly fitted: however, from the appearances diligently Collated, we will deduce some Theses in order, which may make at least some steps towards, if not obtain the verity of this thing.

It is to be noted therefore, in the first place, that this Medicine, being inwardly taken, especially exerciseth its force and energy on the Mass of Blood: because, it does not at all irritate the Viscera, neither causes in them any excretion, or trouble; besides, whilst it communicates its vertue to the Blood, it doth not at all put forth Anti-feaverish property; wherefore, not always the next following fit, but the second, or the third, is prevented, by the same being taken: and for this reason, that it may sooner affect the Blood, it is a usual thing, to drink the Liquor, very much impregnated with the same Powder, for so its Particles are more easily conveyed into the Mass of Blood. Secondly, The Vertue of this Bark, being impressed on the Blood, stays in it for some time, and that either shorter or longer, according as either a greater or lesser portion of the Medicine was taken inwardly; for the Particles of this, being confused with the Blood, are a long while circulated with it, and by how much the longer they stay, by so much the more they affect its mass, and produce a longer effect: for though Aliments, and some other things taken in, for that they are presently overcome by the native heat, put off whatever they have of vertue, within some few hours, this being then assimilated, or sent forth adoors, they cease to operate: yet some Medicines being taken inwardly, because they are not easily tamed, nor cast forth of doors presently, by an irritation stirred up, they remain for many days very active, and hold a long time the Juices, and the Blood, in this or that manner of Fermentation, this may be observed of some Medicines, also of Poysons, and Counter-poysons, the once or twice taking of which, for some days, is wont to affect our Bodies for a longer time; for 'tis an usual thing which Cathartick Medicines, when they work little by Vomit, or Stool, to break forth after many Weeks outwardly, in Pustles and Welks: yea, if Death be avoided, from the drinking of Poyson, every body knows, that the virulency will lie hid, a long time in the Blood and Juices. In like manner also, this Powder, and perhaps very many other things inwardly taken, altho' they seem asleep, yet continue to act, on the Spirits and Humors.

Thirdly

Thirdly, Altho' this Medicine acts immediately on the Bloud and Humors, yet it takes not wholly away, the Feaverish Dyscrasie, implanted in them: for, as soon as its force is consumed, and all its Particles are flown away, from the mixture of the Bloud, the Distemper being only suppressed for a time, at length rises up, and repeats its fits after its wonted manner, but forasmuch as Nature, by the space of this cessation, becomes stronger, therefore, after the Relapse, the fits (not as before) but on the third or fourth day, according to the first figure of the Disease, are wont to return.

Fourthly, It is remarked, that this Remedy, does not stop the Feaverish accessions, as the ordinary Ague-resisters or Febrifuges, by fixing, or also by fusing the Bloud; for then the next fit always, and not the second, or third following after, is prevented.

According to which positions, that we may instead of a Corollary, subjoyn some things concerning the manner it self of working, whereby this Medicine seems to act; we say, it is most likely, that when the Particles, proceeding from the same being taken, are throughly mixed with the Bloud, they compel it into a certain new Fermentation, by which, whilst the Particles of the Bloud are continually agitated, they are wholly hindred, that they cannot heap up any Excrementitious matter, or enter into Feaverish turgescencies; for, as after the biting of a mad Dog, or stinging of any venomous Creatures, the Bloud it self, and nervous Juice, are a long while impoysoned, yet lest they should conceive presently great irregularities, Counter-poysons being taken do hinder their Liquors, by retaining them in another Fermentation; the use of which, if so long continued, whilst the virulent little Bodies are quite flown away, no horrid symptom is to be feared, from that evil being contracted; but if the strength of the Remedy, being too sparingly given, be first consumed, forthwith the Venom repullulates, and the old Poyson, thought to have been exploded, is at length brought into act: by the same way, when the Bloud, having gotten a vitious disposition, perverts the Alible Juice, and whereby it might more rightly expel it, heaped together to a fulness, conceives Feaverish swellings up; this Peruvian Bark being beaten, and administred, by the Commerce of its Particles, so agitates the Bloud, tho' distempered with an evil disposition, with a new excited Fermentation, and alters it, that it in some measure concocts the nourishable Juice, and continually evaporates its Recrements, that they are not heaped together as before, into the matter of a fit: But, when the Particles of this Remedy, are wholly flown away, from the company of the Bloud, and the whole virtue consumed, the evil disposition of the Bloud, before contracted, at length rises up, and so the Feaverish fits return, after their wonted manner. Sometimes perhaps it happens, that whilst the Feaverish fits are suppressed, by the use of this Powder, by reason of the season of the Year being changed, or by the help of another Remedy, or by the endeavour of Nature it self, that Dyscrasie of the Bloud may be mended, by degrees, and so the Feaver may at length vanish, of its own accord. This I have known to happen, but very rarely, because almost with the same certainty, by which you expect the Feaverish fits to be suppressed, by that Powder, you may afterwards look for their return.

As to what appertains to the sensible qualities, with which this Bark is noted, it appears to abound with bitterness, and a certain stipticity, that it seems to the taste, to have the likeness of Savor, which is in most Counter-poysons, as the Root of Gentian, Serpentary, Contrayerva, *&c.* for what are bitter in act, are strong in excellent virtue, for the suppressing the force of preternatural Ferments; yea, the Root of Gentian, which is likest to this Bark, was in times past of famous use, for the Curing of Quartan Feavers. But now, altho' this Peruvian Powder, be the only Alexiterion or Counter-poyson, as yet found out against a Quartan Feaver, to wit, that inhibits (tho' only for a time) its fits, and of other Intermitting Feavers, yet it is not to be doubted, but that there are in the World, other Medicines extant, which are as good Ague-resisters; and it is hoped, that led by the example of this new invention, we may be excited, to the finding out the virtues of Herbs, almost as yet unknown: so, which whilst we shall insist on the trial of several, and the Empirical be joyned to the Rational Medicine, without doubt the Cures of the Quartan Ague, and of other invincible Diseases, may more happily be accomplished: which therefore I promise more willingly to this Age, or at least to the next, when being led by the Analogy of this Book, I have found out a Medicine, for the profligating of Feavers, of use not contemptible, it not being long since variously tryed, which also I am wont to give to the poorer sort, instead of something else, with good success.

CHAP. VII.

Of Continual Feavers.

A Continual Feaver is that, whose fit is continued for many days, without intermission; It hath its times of remission, and of more fierceness, but never of intermission; the burning is now more remiss, now more intense, but still the sick are in a Feaver, until by the temperament, or insensible growing well, the Disease is wholly cured. Concerning this, it behoves us to inquire, what Effervescency of the Blood it is, which causes a continual Feaver; then, by what ways, and from what causes, it is wont to be excited: also, how it differs from that, which is in Intermitting Feavers. And these being performed, we will descend to the Species of Continual Feavers.

There are many ways, by which the Blood growing hot, induces a continual Feaver, the chief of which may be reduced to these Heads: The first way is, when the more spirituous, and subtil Portion of the Blood, becomes too hot, and is distempered, with a certain burning, which therefore agitates the other parts of the Blood, and incites it into a certain rage, so that the Sulphur, or the Oily part of the Blood, is more dissolved, and more inkindled in the Heart, also, for that cause, there is among all the Particles of the Blood, a certain syncrisis, contrariety, or perturbation, by which in truth, being confused, and put out of order, they are not able quickly to be extricated, and reduced into their former posture, wherefore a heat and burning more than is wont to be, is stirred up in the whole Body: but when the Spirits are only in fault, their heat and disorder, are wont within a short space, to be allayed of their own accord; therefore, this Feaver is often terminated within a day, and is rarely continued beyond three: and therefore, is called and Ephemera, or a Feaver of a day, or Synochus of more days.

2. The second manner, or degree of growing hot, is when the Sulphureous or Oily part of the Blood, being too much heated, conceives a Fervor: for then, it both grows immoderately hot in the Vessels, and being very much inkindled in the Heart, produces by its deflagration, a very strong heat in the whole Body. Indeed the Blood, as to its temper, mostly depends on the condition of the Sulphur; when by reason of Crudity, the Sulphur is less dissolved, the Blood is made watery and cold, and is moved slowly in the Vessels: but if the Sulphureous, or Oily part of the Blood, grows hot, beyond its Natural disposition, presently it becomes fierce, and improportionate with the rest, so that, almost the whole being acted, as it were into a flame, by the Ferment of the Heart, compels the mass of Blood to grow immoderately hot, and and to boil up. For as when Wines, indued with a rich Lee, are stirred up into an heat, by the too rancid Sulphur; or as Hay, laid up too wet, by reason of the want of Ventilation, conceives of its own accord a burning, the Particles of the Sulphur being loosned from the mixture; in like manner, when the Blood is not rightly ventilated, but being restrained from Evacuation, by reason of the admixtion of some hot thing, or a more plentiful sanguification, or for some other cause, the Particles of the Sulphur begin to be thickly gathered together; presently, all its Liquor, immoderately boils up, by the Sulphurs being loosned, and inflamed in the Heart, and this kind of Feaver is induced, which is called a putrid Synochus; notwithstanding which appellation, tho' of many rejected, for that the Blood so long as it is in motion, doth not putrifie; yet forasmuch, as in this Feaver, the mixture of the Blood, is somewhat loosned, by the Sulphur being too much exalted, and the mass of its Liquor being changed, from its Natural disposition, tends toward putrefaction; therefore, the term of a putrid Feaver, as hath been anciently used, may be still, with good reason, retained.

3. The third degree of growing hot, (and which constitutes a distinct kind of continual Feaver) is excited, from a certain malignant, and invenomed Ferment, by which, when the mass of the Blood is imbued, and the Spirits, and the Sulphureous part together, conceive an heat, and their burning is not sooner appeased, than that either that malignant matter be consumed, and cast forth of doors, or else a certain coagulation, and as it were putrefaction, of the Blood from its corruptive venom is induced, by which, both circulation is hindred, and the Vital Spirit extinguished. This malignity is wont to arise, either from a certain contagion received from without, or from some infection begotten within us; according to these ways the malignant Feaver, Small Pox, Measles, and also the Plague, draw their beginnings, and by their contagion, far and near set upon many.

There are therefore three degrees, or manners of growing hot, by which, the kinds of continual Feavers are determined. From the subtil portion of the Blood made hot, or the Ebullition

tion of the Spirits, the Ephemera ariſes, as alſo the Synochus of one or more days; by the Sulphureous or Oily part of the blood, being too hot and inkindled, the putrid Feaver is ſtirred up; then thirdly, upon an envenomed taint, infecting the blood, and congealing its Liquor, malignant Feavers depend. In every one of theſe, by the depravation, or rather corruption of the alible Juice, freſh carried into the blood, the various fits, inequalities, and critical motions ariſe. But before I enter upon the ſeveral kinds of a continued Feaver, it is requiſite for me, to conſider, how the growing hot of the blood, in a continual Feaver, differs from that other, which conſtitutes intermitting Feavers.

I ſay therefore, that the growing hot of the blood, in an intermitting Feaver, depends only, upon the commixtion of acertain fermentative matter, and not rightly miſcible, with the blood, and on its growing up, to a fulneſs of boiling over. Becauſe of this heat, with the blood in the Veſſels, and of the deflagration in the Heart, the fit is induced; becauſe of its growing cool, the intermiſſion follows, that in the coming between of the fits, neither the Spirits, nor Sulphur, become outragious, but the bond of the mixture being kept whole, the Liquor is circulated in the Veſſels, equally, and without trouble: on the contrary, in a continual Feaver, the diſorders of the Spirits, and of Sulphur, of either, or both together, by their proper Ebullition, alſo without the mixture of any other, ſtir up the Ebullition of the blood; wherefore there are required, for an intermiſſion, beſides the diffiation or cooling of the excrementitious matter, a deflagration of the enkindled blood, and a reduction of it to its due temper.

The Conſtitution of the blood in a continual Feaver, is of the ſame ſort as of Wines, when they grow hot upon too rich a Lee; to wit, are mighty in Spirit, and grow turgid with exalted Sulphur, and therefore they conceive a fervor, and greatly boil up of their own accord, without the mixture of any other thing. In an intermitting Feaver, the blood is moved after that manner, as Wines, when they conceive an heat, becauſe of ſomething poured to them, that is not miſcible with them: Moreover, in this Feaver, the diſpoſition of the blood is of that ſort, as of Wines, when in their decay and declination, they become ropy, unſavoury, or acid, to wit, in which the Spirit is depreſſed, that in the mean time, either Salt, or Sulphur, or both together, appear above the reſt, and infect the whole Liquor with their diſorder. An intermitting Feaver, for the moſt part is free from danger, becauſe the conſtitutive parts of the blood, although they ſhould ſomewhat change their diſpoſition, however, keep the bond of mixtuer, and whilſt they are in power, are circulated equally in the Veſſels, yea, they pervert the nutritious Juice into a matter, not altogether beſides Nature, but rather infeſting, with its fulneſs and turgeſcency. In a continual Feaver, beſides the intemperance, the mixture of the Blood, and conſtitution of the Liquor are ſomewhat looſned, and its corruption eaſily follows; wherefore this Diſeaſe often ends in death: further, the nouriſhing Juice is depraved into a matter wholly vicious, and altogether infeſtous to Nature.

Chap. VIII.

Of the Ephemera, or Feaver for a Day.

I Have ſaid, the leaſt degree of heat, which induces a continual Feaver, is placed in the ſubtil, and ſpirituous part of the Blood, being too much agitated and heated; for this, like the Spirit of Wine, boils up on every light occaſion, and conceives a fervor, by a too great motion of the Body, or perturbation of Mind, by the ambient heat, as of the Sun or Vapors, by hot things taken inwardly, as the drinking of Wine, and the eating of Pepper'd meats, and being irritated by ſuch like. For the Spirits of the Blood eaſily take fire, and being impetuouſly moved, are not preſently appeaſed, but they move throughly other Particles of the Blood, variouſly confound and ſnatch them into a rapid and diſorderly motion; alſo from this motion of the Spirits, the Sulphur, or Oily part of the Blood is more boiled forth, ſomewhat more diſſolved, and ſomething more fully enkindled in the Heart, by which means, an intenſe heat is raiſed up, in the whole Body. But foraſmuch as Sulphur is enkindled, and inflamed only by ſmall parts, and not in the whole, that fervor of the Spirits is quickly appeaſed, and ceaſes; wherefore the Feaver which is excited by this means, for the moſt part is terminated within twenty four hours, and therefore is called an Ephemera, or a Feaver of a day. If that by reaſon of a greater heat of the Spirituous Blood, it is prolonged further, it rarely exceeds three days, and is called an Ephemera of more days, or a Synochus not putrid; but if it

ſhould happen to be lengthened beyond this time, this Feaver eaſily paſſes into a putrid, *viz.* from the daily ebullition of the Spirituous Blood, the more thick particles of the Sulphur at length begin to take fire, and involve the whole Maſs of Blood in its effervescency: even as the Spirit of Turpentine, being ſhut up in a Cucurbit, and being put into a Sand Furnace, if it be forced with a moderate heat, boils up gently, as the Blood in a Feaver of a day; but if the heat be made more ſtrong, the Liquor grows impetuouſly hot, till it breaks forth into a flame, to which the inflammation of the Blood, in a putrid Feaver, may be very aptly compared.

The Days Feaver, and Synochus ſimple, rarely begin without an evident cauſe: Beſides what hath been but now ſaid, immoderate Labour, Watchings, a ſudden paſſion of the mind, a conſtriction of the Pores, a Surfeit, alſo a Bubo or inflamed Sore, a Wound, the coming down of the Milk in Child-bearing Women, are wont to induce them: The procatartic Cauſes, which diſpoſe to this, are an hot temper of Body, an active Habit, a ſedentary Life, and diſuſe of exerciſe.

The chief beginnings of this Diſeaſe depend upon the preſence of the evident Cauſe; for either, little Bodies of extraneous heat, being confuſed with the Blood, like water boiling over the fire, make it to boil up; or this Feaver is induced, by motion, or by reaſon of tranſpiration being ſtopped; even as Wines made hot by motion, or when too cloſely ſtopped in the Ton, are put into a fervor: but what way ſoever an inflammation is firſt excited, preſently the Spirits become enraged, and being moved hither and thither, compel the Blood to boil up, and to be enlarged into a greater ſpace, with a ſpumous rarefaction; wherefore the Veſſels are diſtended, and the membranous parts halled; hence follow pain, chiefly in the Head and Loins, a ſpontaneous wearineſs, and as it were an inflation of the whole Body. If that, with the Spirit of the Blood, a certain ſulphureous part be alſo in ſome meaſure inkindled, a ſharp heat is diffuſed through the whole, the Pulſe is vehement and quick, the Urine red, alſo thirſt, watchings, and many other Symptoms infeſt, the Reaſons of which are added hereafter.

Concerning the Solution, or Criſis of the Ephemeran Feaver, and of the not putrid Synochus, three things are chiefly requiſite, *viz.* a removing of the evident cauſe; ſecondly, a ſeparation, and a ſcattering of the depraved or excrementitious matter, from the maſs of Blood: thirdly, a quieting of the parts of the Blood, and a reſtitution of them to their natural and equal motion and ſite. According as theſe ſucceed, now more ſuddenly, now more ſlowly and difficultly, this Diſeaſe is finiſhed in a ſhorter or longer time.

1. The evident cauſe, which for the moſt part is intrinſick, is eaſily removed, and the ſick are wont, preſently to avoid the preſence or aſſiduity of that thing, and do perceive a ſenſe of any thing that is hurtful; none taking a Feaver from Wine, will ſtill indulge the drinking of it, aſſoon as any one grows more than uſually hot, in a Bath, or the heat of the Sun, 'tis a trouble to them to ſtay longer.

2. As to the excrementitious Matter, which ought to be ſcattered and ſeparated from the Blood; this is either brought from without as when the Blood is infected by ſurfeit, drinking of Wine, ſitting in the Sun, or from too hot a Bath, with *Effluvia*, or little dry and fermentative Bodies; or this matter is begotten within, as when its Liquor is ſtuffed with Recrements, or aduſt Particles, from the deflagration of the Blood. Either of theſe matters ought to be ſeparated from the Blood, to be diſperſed, and either by ſweat, or inſenſible breathing forth, to be thruſt out of doors, before the Feaver be appeaſed: wherefore, whenas the pores are bound up, and tranſpiration hindred, the Ephemeran Feaver is longer protracted, and ſometimes paſſes, from a ſimple Synochus, into a putrid.

3. The evident Cauſe being removed, and this degenerate matter diſperſed, there is required for the remiſſion, a quieting, and reducing into order, the parts of the Blood; for divers Particles of the Blood, being after this manner confuſed; and by reaſon of the Feaveriſh heat carried up and down, they do not preſently get again the former order of ſituation and poſition; but it is needful that they be by degrees extricated, and by little and little reſtored, to a juſt mixture.

Although this Diſeaſe, after the removing of the evident Cauſe, for the moſt part ceaſes of its own accord, within a while, yet ſome Medicinal Remedies may be adminiſtred with good ſucceſs, eſpecially, when there is danger, leſt the Ephemeran Feaver, ſhould paſs into a putrid. The chief Intentions ſhould be, to ſuppreſs the fervor of the Blood, and to procure a more free tranſpiration; to the which conduce, firſt, a breathing of a Vein, a ſlender Diet, or rather Abſtinency, cooling Drinks, and a bringing away the filth of the belly, by Clyſters: Sleep and reſt greatly help, above all the reſt; which, if wanting, ſhould be procured in time, by Opiats, and Anodines.

Verily, although the Hiſtories, and Obſervations of thoſe, diſtempered with an Ephemeran Feaver, contain in themſelves nothing very rare; yet I ſhall ſubjoin an example or two in this place, whereby the Delineation or Type of this Diſeaſe may be illuſtrated.

A certain young Gentleman, about twenty years of Age, endued with a ſtrong habit of Body, by the immoderate drinking of ſtrong Wine, fell into a Feaveriſh diſtemper, with thirſt, heat, and with a great burning of his Præcordia; being let Blood, he drank a great quantity of fair water, and upon it preſently a plentiful ſweat following, he grew ſhortly well: In this caſe, the more thin portion of the Blood, being heated by the Spirits of Wine, fell into a rage, cauſed the whole Maſs of Blood to be ſhaken, and its frame to be looſned more than 'twas wont; and for that reaſon, that hapned to be more diſſolved, by the Ferment of the Heart, and to be as it were enkindled by the active Particles, looſned from the mixture; until the Veſſels being emptied by Phlebotomy, the raging Blood was cooled, and by the drinking of the water, its fervor was attempered; then the hot *Effluvia* being involved, together with the aduſt Matter, with a copious *Serum*, and ſent away by Sweat, the Blood at length recovered its due temper. Moreover an ingenious young man, of a ſedentary life, and alſo very much addicted to the ſtudy of Learning, when he had for ſome time exerciſed himſelf beyond his ſtrength, in the hot Sunſhine, he began to complain of the pain of his head, a want of Appetite, a heat of his Præcordia, and of a Feaveriſh diſtemper all over; to whom (for that he was wholly averſe to Phyſick) I ordered an abſtinence from all things whatſoever, unleſs from ſmall Beer and Grewel; on the ſecond day, and ſo more on the third, the Symptoms remitted, by little and little; on the fourth, he went home freed from the Feaver, without any Medecine.

Chap. IX.

Of a Putrid Feaver.

So much for a Continual Feaver, which is raiſed from the moſt ſimple heating of the Blood, or its loweſt degree of inordinate heat; that which depends on a greater degree of heat follows, *viz.* when the Oily and Sulphureous part of the Blood, being too much heated, ſwells up above meaſure, and as it were forced into a flame; and therefore from the ſimilitude, by which humid things putrifying, conceive an heat, this kind of Ebullition of the Blood, becauſe it induces an immoderate heat, is called a putrid Feaver: which Name ought to be retained without injury, becauſe that in this Feaver, the Syntheſis of the Blood (as is wont to happen in putrefying Liquors) is very much unlocked. When the Spirits only grow enraged, (as in an Ephemera) the frame of the Blood is ſomewhat ſet open, and looſned, that it is more diſſolved, by the Ferment of the Heart, than is wont, and more Particles than naturally uſe to do, leap forth, and diffuſe a more intenſe heat; but yet the mixture of the Liquor, as to its chief parts, is conſerved. But when the Sulphureous matter taking fire, grows hot above meaſure, the bond of the mixture, for the greateſt part, is looſed, that its Principles are almoſt wholly drawn away, by the Ferment of the Heart, and the active Particles, being looſned from the mixture, break forth as it were into a flame. Wherefore, the Liquor of the Blood being after this manner rarified in the Heart, and as it were enkindled, is from thence carried through the Veſſels, with a moſt rapid motion, and diſperſes very many *Effluvia* of heat, from its deflagration. Hence, the whole maſs of Blood (like water put over the fire) continually, boiling, diſtends the Veſſels, pulls the Brain and Nervous parts, raiſes up Convulſions, and pains in them, very much deſtroys the Vital Spirits with its heat, waſtes the Ferments of the Bowels, hinders the Offices of Concoction and Diſpenſation, often depraves the nouriſhing Juice, deſtinated for the Nervous ſtock, that from thence exceeding great diſorders of the Animal Spirits follow; yea almoſt perverts the whole œconomy of Nature.

The courſe of this Diſeaſe ſhews it ſelf after this manner; It rarely begins without a procatartic cauſe, or previous diſpoſition: to wit, the Sulphureous or Oily part of the Blood, is firſt too much carried forth, and exalted beyond its due tenor, which afterwards, either of its own accord (like Hay not eventilated) begins to grow hot, or by the coming of an evident cauſe, it is forced into a preternatural heat. But when it grows turgid in the firſt place, by reaſon of the admixtion of a crude Juice with the Blood, now a ſhivering, now heat infeſts, which ſhew themſelves unequally, like Fire which is covered with green wood, ſends forth now ſmoke, now flame: But at length, the fire glowing more largely, as here the victor fire ſpreads it ſelf abroad, ſo there (ſooner than ſaid) the whole maſs of Blood is inflamed, and is urged at once with heat, and a moſt ſwift motion; nor is this immoderate heat of the Blood appeaſed, before its active Particles being looſned from the mixture, and then ſucceſſively inkindled in the Heart, are wholly burned out, which doth not happen, but in the ſpace of many days. And then at length this Feaver ceaſes, when the remaining Liquor of the Blood, the Spirit and Sulphur being very much conſumed, being made lifeleſs and poor, is fit only for a weak and ſmall

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Fermentation. From this kind of deflagration of the Blood, and alſo of the alible Juice (by the ſame fire burnt out) the recrements, or little Bodies of torrifi'd matter, are heaped up in the Blood, which yet do more promote its fervor and ebullition, and for a time increaſe the Feaveriſh diſtemper. After the blood hath very much burned forth, and theſe kind of little bodies are gathered together to a fulneſs of ſwelling up, the vital Spirit endeavors a ſeparation, and tries to concoct, and to overcome (what it may) theſe aduſt recrements, and then, having put a great many of them into a ſwelling up, a Flux being riſen, ſtrives to ſhut them wholly out. And indeed, in the ſubaction and ſecluſion of this matter, chiefly conſiſts the event of this Diſeaſe; for if the vital Spirit being ſtrong, the bloody Humor (when it hath ſufficiently burned forth, and ſhall be freed from theſe aduſt particles) ſhould recover its priſtine tenor, whereby it is made fit for motion, and a due fermentation in the heart, the ſick tends towards health; but if by a long deflagration, and an inextricable confuſion of the morbific matter, the liquor of the Blood, being wanting of Spirits, and more pure Sulphur, or thoſe ſame (by the impure mixture growing ill) being as it were put under the yoke, is rendred ſo lifeleſs, that it is not any longer rarified by the ferment of the Heart, or enkindled, by degrees its heat and motion, together with Life it ſelf decays.

The procatartick Cauſes, which diſpoſe to this Diſeaſe, are, a hot and humid Temper, an active habit of Body, a youthful Age, the Spring time, or Summer ſeaſon, a high and rich Diet, beſides the often drinking of rich Wines, a ſedentary and idle Life, a Body full of groſs Humors, and ſtuffed with vicious Juices; but above all the reſt, it appears by obſervation, that the frequent letting of Blood, renders men more apt to Feavers; wherefore it is commonly ſaid, from whom blood is once drawn, that unleſs they do the ſame every year, they are prone to a Feaver. The reaſon of this is (unleſs I am deceived) by the frequent letting of blood, the Sulphur is more copiouſly gathered together in the Maſs of blood; in the mean time, the Salt (which ſhould bridle it, and hinder it from raging) by this means is drawn away; for the blood, the older it grows, becomes ſo much the more ſalt, the Salt of all the Elements not evaporating. But by how much the more the Blood abounds in Salt, by ſo much the leſs it abounds in Sulphur; for Salt eats and conſumes the Sulphur, and makes it evaporate: wherefore they who are lean, and abound with a ſalt blood, are leſs prone to Feavers. But when by the letting of blood, the ancient blood is drawn forth, in its ſtead another more rich, and more impregnated with Sulphur, is ſubſtituted; ſo that it becomes leſs ſalt, and more ſulphureous. Hence it is, that thoſe who often let blood, are not only prone to Feavers, but alſo are wont to grow fat, becauſe of the blood's being more impregnated with ſulphureous Juice.

The evident Cauſes which deduce the latent diſpoſition of this Feaver into act, are of the ſame ſort, which procure an Ephemeran Feaver, and ſimple Synochus; in this rank chiefly come, Tranſpiration being hindred, and Surfetting. By reaſon of the *Effluvia* being reſtrained, the Maſs of the blood being increaſed in bulk grows turgid, and conceives a Fervor, as it were from a certain Ferment, inſpired anew, and cruelly boils up; from thence, preſently the pores are more obſtructed, by the infartion of the *Effluvia*, and the frame of the Liquor being looſned, the particles of the Sulphur exuberating in the blood, leap forth from the mixture, and are inflamed by the ferment of the Heart, as it were by fire put to them, and ſo they enkindle a very intenſe Feaver. But from a Surfeit, both an immoderate fermentation is induced in the blood, and alſo a nitrous ſulphureous matter, apt for aduſtion, and an inkindling is conveyed, as it were food, to the burning blood.

In this Feaver, four times or ſeaſons are to be obſerved, in which, as it were ſo many poſts, or ſpaces, its courſe is performed: Theſe are then, the Beginning, the Augmentation, the Height, and Declination. Theſe are wont to be finiſhed in ſome ſooner, in others more ſlowly, or in a longer time. The beginning ought to be computed, from the time the blood begins to be made hot, and its Sulphur to conceive a burning, until the ardors and burnings are diffuſed, through the whole maſs of blood. The Increaſe or Augmentation, is from the time, that the blood being made hot, and inkindled through the whole, burns forth for ſome time, and its maſs is aggravated with the Recrements, or burnt Particles, which increaſe the fermentation. The ſtate, or ſtanding of the Diſeaſe, is, when (after the blood has ſufficiently burned forth, and its burning now remits) the long vexed blood, like a noble Wreſtler, when his Adverſary is a little yielding, recollecting all his ſtrength, endeavors a bringing under, and a ſeparation of that aduſt matter, with which it is filled to a plenitude, and alſo a Criſis or ſeparation being once or oftner attempted, an expulſion of it forth of doors. The Declination ſucceeds after the Criſis or Secretion, in which the blood grows leſs hot, with a languiſhing fire, and either (the vital Spirit being as yet ſtrong) overcomes what is left of that aduſt and extraneous matter, and by degrees puts it forth, until it is reſtored to its former vigor; or, whilſt the ſame Spirit is too much depreſſed, the Liquor of the blood is ſtill ſtuffed with aduſt Recrements, and therefore becomes troubled and depauperated, that it neither aſſimilates the nouriſhing Juice, nor is made fit for an accenſion in the heart, for the ſuſtaining the Lamp of Life.

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1. When therefore any one is taken with a putrid Feaver, the firſt aſſault is for the moſt part accompanied with a ſhivering or horror: for when the Bloud begins to grow hot, there is a flux made, and a ſwelling up of the crude Juice, freſhly gathered together in the Veſſels, even as in the fit of an intermitting Feaver, heat, and ſometimes ſweat follow, upon the ſhivering, by which, the matter of that crude Juice is inkindled, and diſperſed: afterwards, a certain remiſſion of the heat follows, but yet from the fire ſtill glowing in the Bloud, a laſſitude, and perturbation with thirſt, and waking, continually infeſt: A pain ariſes in the Head, or Loins, partly from the ebullition of the Bloud, and partly from the motion of the nervous Juice being hindred; alſo a nauſeouſneſs, or a vomiting offends the Stomach, becauſe the Bile, flowing out of the Choleduct Veſſels, is poured into it, and a Convulſion from Vapors, and from the ſharp Juice brought through the Arteries, is excited in the Stomach. In the mean time, altho' the heat be more increaſed, and inequal, it is not yet ſtrong, becauſe the Bloud as yet abounding with crude Juices, is only inkindled by parts: and therefore burns out a little, and then ceaſes, and at laſt returns; like a flame that is made by wet and moiſt ſtraw. In this condition for ſome days, the Diſeaſe remains, the Urin is more red than uſual, by reaſon of the Salt and Sulphur being more diſſolved and infected with the *ſerum*; It ſtill retains its Hypoſtaſis or ſubſtance, becauſe the Coction and aſſimilation are not altogether depraved; it appears greater than ordinary in its ſediment, which is yet eaſily ſeparated, and falls to the bottom of its own accord. At this time, they may let Bloud, and adminiſter Phyſick by Vomit, or Purge, ſo it be done without any great perturbation of the Bloud: it often happens, from theſe kinds of evacuations, timely performed, that a greater increaſe of the Diſeaſe is prevented, and the Feaver as it were killed in the ſhell. The limits of this ſtadium or ſpace, are variouſly determined, according to the temper of the ſick, and other accidents of the Diſeaſe; ſometimes, the firſt rudiments of this Feaver, are laid in a day or two; ſometimes the beginning of the Diſeaſe is extended to more; if in a corpulent Body full of Spirit, Juice, and hot Bloud, or it happen in a youthful Age, and very hot ſeaſon, if the diſpoſition to a Feaver be potent, and the evident cauſe coming thereupon be ſtrong, the Feaveriſh heat, being once begun, quickly invades all the Bloud, and on the ſecond and third day, having rooted it ſelf, the Diſeaſe ariſes to its increaſe; but if the Feaveriſh indiſpoſition, be begun in a leſs hot Body, a Phlegmatic temper, or a melancholy, and in old age, or a cold ſeaſon, the entrance is longer, and ſcarce exceeds the limits of this firſt ſtadium or ſpace, before the ſixth or ſeventh day.

2. The increaſe of this Diſeaſe, is computed from what time the burning of the Feaver hath poſſeſt the whole maſs of Bloud: that is, the Sulphur, or the Oily part of the Bloud, having been long heated, and growing fervent in parts, at length, like Hay laid up wet, breaks forth, after a long heating, all at once into a flame; the Bloud at this time cruelly boils up, and very much inkindled in the Heart, by its deflagration, diffuſes as it were a fiery heat through the whole Body, and eſpecially in the Precordia; hence the ſick complain of intolerable thirſt, beſides a pain of the Head, pertinacious wakings, and oftentimes a Delirium, Phrenſie, and Convulſive motions infeſt: all Food whatſoever is loathſom, either it is caſt up again by Vomit, or if retained, being baked by too much heat, it goes into a Feaveriſh matter; beſides, there happens a bitterneſs of the mouth, an ingrateful ſavor, a ſcurfineſs of the Tongue, a vehement and quick Pulſe, an Urin highly red, and for the moſt part troubled, full of Contents, without Hypoſtaſis or laudable ſediment; when the Bloud is at this time almoſt wholly inkindled by its deflagration, it begets great plenty of aduſt matter, (as it were aſhes remaining after a Fire) with which the *ſerum* being very much ſtuffed, renders the Urin thick, and big with Contents: Alſo the Bloud, being filled with a load of this, to a riſing up, is irritated into Critical motions, by which this Feaveriſh matter, (if it may be done) being brought under, and ſeparated, is ſhut out of doors; and indeed this ſtate of the Feaver induces that, in which a Judgment is diſcerned, between Nature and the Diſeaſe, the ſtrife being as it were brought to an æquilibrium; and therefore the evacuation, which follows from thence, is called the Criſis.

The ſtate therefore, or height of a putrid Feaver, is that time of the Diſeaſe, in which Nature endeavors a Criſis, or an expulſion of the aduſt matter, remaining after the deflagration of the Blood. To this is required, in the firſt place, that the Bloud hath now for the moſt part burned forth; becauſe in the midſt of its burning, Nature is not at leiſure for a Criſis, nor is it ever proſperouſly endeavored, nor in truth procured by Art with good ſucceſs. Secondly, That the ſpirit of the Bloud, doth firſt, by ſome means ſubdue this aduſt matter, or *Caput mortuum*, ſeparate it from the profitable, and render a period to the expulſion, for otherways, tho' a copious evacuation happens, Nature will never be free from her burthen. Thirdly, That this matter, be gathered together in ſuch a quantity, that by its turgency, it may irritate Nature to a Critical expulſion. If theſe rightly concur, a perfect Criſis of the Diſeaſe, for the moſt part ſucceeds, in which, even as in the Fits of intermitting Feavers, a Flux being ariſen, whatſoever extraneous and heterogeneous thing, is contained in the boſom of the Bloud, is exagitated, then being ſeparated, and involved with *ſerum*, it is thruſt forth of doors; when any thing of theſe is wanting, the Criſis, for the moſt part, is in vain, and not to be truſted, and rarely cures

cures the Diſeaſe. For if in the midſt of the burning, before the Bloud hath ſufficiently burned forth, an evacuation happens, by Sweat, a Lask, Bleeding, or any other way, the aduſt matter is not all ſeparated, or elſe, if for the preſent, it be drawn away for the greateſt part, the Bloud more largely flaming out, preſently ſubſtitutes new, and will renew the Feaver again, that ſeemed to be vanquiſhed: If that this matter, not being yet overcome, nor brought to a fulneſs of riſing up, be irritated to an expulſion by Nature, an imperfect, and partial Criſis only follows; and when the firſt indeavor of excretion ſhall be in vain, rarely a perfect, and curatory ſucceeds after that one time.

The Criſis in a continual Feaver, is almoſt the ſame thing, as the Fit of the intermitting Feavers. For as in this, when the maſs of Bloud, is filled to a fulneſs of ſwelling up, with the Particles of depraved alible Juice, and fitted for maturation, there are made a Flux, ſecretion, and expulſion out of dores of that matter: ſo in a continual Feaver, from the deflagration of the Bloud, and alible Juice, very many little Bodies of aduſt matter are gathered together, with which, when the Bloud is aggravated, and is at leiſure, a little from the burning, it overcomes them, by little and little ſeparates them, and then a Flux being raiſed up, endeavors to caſt them out of dores: wherefore, as the Fits of Intermitting Feavers come not but at a ſet time, and after ſo many hours, ſo alſo the Critical motions happen from the fourth day to the fourth, or perhaps from the ſeventh day to the ſeventh, for in this kind of ſpace, the Bloud being inkindled burns forth, and with its burning makes an heap of aduſt matter, as it were aſhes, which being troubleſom to Nature by their irritation, induces Critical motions.

Therefore, what ſome affirm is not true, That the Criſes depend altogether on the influences of the Moon, and Stars, and follow their Aſpects, Quadrations, Oppoſitions, or Conjunctions: becauſe the Critical evacuations are only determined, by the gathering together, and the ſwelling up of the aduſt matter. For, as ſoon as the Bloud is at leiſure, from the deflagration, and being filled with the particle of that aduſt matter, is able in ſome meaſure to overcome, and ſeparate them, preſently a Flux, or ſwelling up being riſen, it endeavors to thruſt them forth by any way; which, for that they are eaſily to be ſeparated from the Bloud, and the breathing places of the skin are ſufficiently open, being involved with *ſerum*, are ſent away with ſweat. And this is the beſt way of the Criſis, which if it rightly ſucceeds, very often, wholly, and at one time, perfectly cures the Diſeaſe, without danger of relapſe. To this next, follows the Criſis, which is endeavoured by the Hemorrhage or bleeding at Noſe; for this matter, as it were the flowring, being moved with the Bloud, (if it be not caſt forth by ſweat, by reaſon of a leſs free tranſpiration) is transferred from the heart, into ſome remote part, and frequently is caſt into the Head, by the impetuous rapture of the Bloud; where, if a paſſage be open, from the private holes opening into the noſtrils, the morbific matter, leaps forth of dores, with a portion of the Bloud. But otherways being oftentimes fixed in the Brain, brings a phrenſie, delirium, or other grievous and tedious Diſeaſes of the Head; yea, 'tis to be obſerved, that almoſt in all continual Feavers whatſoever, when they are hardly or imperfectly cured, ſo that the Bloud is infected, for a long time with the Feaveriſh matter or aduſt recrements, that from thence, the nervous Juice (as it ſeems) contracting an Infection, pertinacious Diſtempers; to wit, Watchings, alſo Deliriums, Tremblings, Convulſive motions, and long adhering weakneſs of the nervous parts follow. Alſo, there are other ways of Criſis, by which Nature endeavors, not at once and wholly, but by little and little, and by parts, to expel the Feaveriſh matter; now by Urin, now by Vomit, or Stool, now by breakings forth, and buboes, or biles; by what way ſoever, that it may be done with a good event, it is required, that the deflagration of the Blood be paſt, and that the aduſt matter be concocted, and rendred fit to be ſeparated.

The ſtate or ſtanding of the Diſeaſe, is therefore not one, and ſimple, nor always happens after the ſame manner, but with a various difference of ſymptoms, and tending to far different events. But by a prudent Phyſician, a Prognoſtication is expedient to be given, in what ſpace of time, the Diſeaſe will come to its height or ſtanding, and what end it will have.

If the Feaver be vehement from the beginning, and ſuddenly invades the whole maſs of Bloud with a burning; if it urges conſtantly, and equally without any remiſſion, with a ferocity of ſymptoms; for the moſt part, the Bloud will ſo much burn forth, in the ſpace of four days, that the aduſt matter, will ariſe to a fulneſs of ſwelling up, for the making a Criſis. But if its beginnings are more ſlow, and the accenſion of the Bloud often interrupted, the Feaver will come to its *achme* or height, about the ſeventh day. If it ſhould begin yet more remiſs, the ſtanding of the Diſeaſe is wont to be drawn out, to the Eleventh or Fourteenth day. In the mean time it is to be noted, that as the Fits of Intermitting Feavers return at ſet times, ſo the Critical motions in continual Feavers, (but for the moſt part they obſerve the fourth day:) for altho' the Criſis may be perfectly prorogued to the fourteenth, ſeventeenth, or perhaps the twentieth day, becauſe all things, requiſite to the full curing of the Diſeaſe,

do

do not ſooner concur; yet in the time betwixt, more light motions happen, by which the Feaveriſh matter ariſing leiſurely, to an increaſe, is a little emptied, and as it were cut off by parts, until Nature may be able to enter upon its more full diſcuſſion; but when the great proviſion of the aduſt matter, in the burning Bloud, is heaped up in the Veſſels, Nature, unleſs otherways diſturbed, on every fourth day, being tyred with the plenty of matter, trys to ſhake off part of its burthen, by a certain ſwelling up: wherefore, for the moſt part, the Critical motions happen on the fourth, ſeventh, eleventh, and fourteenth days, not by the direction of the Planets, but by reaſon of the neceſſity of Nature.

As to the event, whether the Criſis ſhall be good or not, certain fore-knowledges are taken, from the ſtrength of the ſick, the Pulſe, Urine, and other ſigns, and concourſe of ſymptoms: If the ſick appear with ſome ſtrength, the fire of the Feaver urging, hath a ſtrong and equal Pulſe, if the Urine be of a moderate conſiſtency with ſome ſediment, with a ſeparation of the Contents, and eaſily falling to the bottom, if the Diſeaſe ſhall make its progreſs, without great Vomiting, Watchings, Phrenſie, Convulſive motions, and ſuſpition of malignity, the ſtanding will be laudable, and to be expected with a good Criſis: if the contrary to theſe happen, *viz.* that preſently ſtrength is caſt down, and that the ſick is obnoxious to frequent Swoonings, Convulſions, a delirium, with a weak intermitting or unequal Pulſe, if pertinacious watchings, intolerable thirſt, and Vomiting continually infeſt; if the Urine be thick and troubled, without ſediment, or ſinking down of the parts, if, the burning yet troubling, Nature is provoked to critical evacuations, a very dangerous ſtate of the Diſeaſe is imminent, nor may there be hoped for any thing of good from the Criſis.

Concerning the Criſis of a Putrid Feaver, we will here ſubjoyn a particular Prognoſtication, in which, though the things, which from the beginning did appear, might promiſe a moſt deſired event, a very deadly one is imminent; I have often obſerved, in a Putrid Feaver, which begins ſlowly, and with a ſmall burning, if the Urine be red, and when rendred preſently troubled, and thick, which is not precipitated, neither by the cold, nor of its own accord, puts down a ſediment, and if at the ſame time, the ſick lie for many days without ſleep, tho' quiet, and that they toſs not themſelves up and down, their condition is in danger: and the ſuſpition will be more, if in the mean time, they are neither troubled with a ſtrong Feaver, nor infeſted with thirſt, or with a very troubleſom heat; becauſe thoſe diſtempered after this manner, are incident for the moſt part, about the ſtate of the Diſeaſe, to a Delirium, Convulſive motions, and oftentimes fall into madneſs, from which they are quickly caſt into death; and when theſe ſymptoms ariſe, the Urine is altered, from a thick and red, into a thin and more pale Urine. It ſeems in this caſe, the maſs of Bloud, being taken with the Feaver, not to grow turgid, ſo with Sulphur exalted to the height, as Wines or Beer are wont in their Efferveſcencies; but (the Salt, and the terreſtrial Lee or Dregs being ſtirred together with the Sulphur) to be affected after the ſame way, as Wines and Beer, being ſuddenly diſturbed with Thunder, and growing ſour; wherefore, altho' the Bloud does not preſently conceive an immoderate heat from the Feaver, yet its diſpoſition being changed, it wholly depraves the Juice deſtinated to the Brain, and Nervous parts, and therefore about the beginning of the Feaver, pertinacious watchings happen, then the ſtate growing urgent, the œconomy of the whole Nervous ſtock is perverted. Melancholick perſons are moſt obnoxious to theſe ſort of Feavers, in whom the unrulineſs of the Sulphur, are a little reſtrained, by the Salt, and Earthy dregs being ſtirred up with it, notwithſtanding which, all being leiſurely carried forth, break forth afterwards, with a greater ſlaughter.

When the Diſeaſe ſhall come to the ſtanding, either the buſineſs is done at one conflict, and from thence with a manifeſt declination, there is made a tranſlation to life, or death, or there are made frequent skirmiſhes, between Nature and the Diſeaſe, and critical motions are often attempted, before the victory is yielded to either party.

1. As to the firſt, If after the Bloud hath ſufficiently burned forth, with a good precurſion of ſigns and ſymptoms, and its burning hath remitted, the aduſt matter being equally brought under, and ſubtilated, ariſes from a full increaſe, to the motion of boiling up; and Nature being free from any impediment or depreſſion, is ſtrong with able ſtrength enough, for the decertation or ſtrife, the Feaveriſh matter, for the moſt part, is exterminated at one motion of its flowring or putting forth, and the Bloud being freed from its fellowſhip and infection, ſoon recovers its former vigour.

2. But if Nature is ſtirred up, to a critical motion, before the Bloud hath perfectly burnt forth, or that aduſt matter is prepared for excretion, altho', as to the reſt, things are in a moderate condition; yet from hence, but an imperfect Criſis follows, by which indeed, ſomething of the load or burthen, with which the Bloud is oppreſſed, is drawn away; notwithſtanding preſently another ſprings up afreſh, in its place, and then at ſet times, (perhaps, in four, or ſeven days ſpace) like the fits of intermitting Feavers, the critical motions are repeated, the ſecond, and perhaps the third time, before the ſtrife being ended, the matter openly inclines to this, or that party.

3. But when, with the preceding evil appearance, of ſigns and ſymptoms, the burning of the Bloud yet urging, the critical motion is provoked, without any coction of the Feaveriſh matter, ſometimes Nature is overthrown at the firſt conflict, nor doth ſhe recollect her ſelf, but yielding her powers overcome by the Diſeaſe, is precipitated into death. Nor is the buſineſs much better, when the Criſis is at firſt imperfect, and in vain, celebrated, without any eaſe to the ſick, and from thence, the next to this ſucceeds worſe, and then in another, and perhaps another conflict, the Diſeaſe prevails, until the ſtrength being wholly broken, and caſt down, there is a plain end of life.

Thus much concerning the ſtate and Criſis of the Diſeaſe, on whoſe good or improſperous ſucceſs, the event of the Diſeaſe depends; the declination of the Feaver, takes its period of this, of which we muſt ſpeak next.

4. Altho' the Declining of the Feaver, for the moſt part, is taken in the better part, that it denotes the condition of the ſick growing well of the Diſeaſe, in which the Bloud being almoſt freed from its Effervency, recovers leiſurely, ſtrength and ſpirits, that were loſt, and expels what extraneous thing is left remaining in its boſom; yet, in a genuine enough ſignification, it may be uſed for that ſtate, when from an ill Criſis, or in vain, the Bloud being depauperated, and infected with an extraneous and Feaveriſh mixture, ſtill declines for the worſe, until at length (like Wine changed into a lifeleſſneſs) being made wholly unable for circulation, and accenſion in the Heart, it calls on death. Therefore, in this place, the name of declination ſignifies the condition of ſick, and of the Diſeaſe, which follows the ſtanding, whether it tends to life, or to death; whether the Feaver, or life it ſelf of the ſick, at this time, declines.

As to the times of declination, it will be worth our labour to inquire, what the temper of the Bloud may be, and what turns of alterations it has undergone, as often as from a good, or bad Criſis, there has been made a progreſs of the Diſeaſe, towards Health, or Death. To wit, firſt, what the diſpoſition, or condition of the Bloud and Spirits may be, from a good Criſis, and with what alterations, its ſpoiled Liquor recovers its former vigor. Secondly, what their temper is, from an evil Criſis, and by what degrees it ſtill tends to worſe; and laſtly, how they are, when from a doubtful ſtate, and long weakneſs, the ſick hardly get up at length, and recover their health.

The vice, or depauperation, which the Bloud hath contracted from the Feaveriſh heat, conſiſts in this: The Spirit very much evaporates, and is loſt: the Sulphureous part is too much ſcorched, and is much waſted by the deflagration, and from its burning, the aduſt matter (as it were the *Caput Mortuum*) is left, with the Particles of which, the maſs of Bloud is aggravated, and debilitated; in the mean time, the Saline and Earthy parts, are too much exalted, even as is wont to come to paſs in Wine, or Beer, by the uſe of too much Ferment. The Bloud, by theſe ways being ſpoiled, evilly aſſimilates the proviſion of the Nutritious Juice, yea alſo, by reaſon of the roaſting of the Sulphur in the Heart, or defect of it, not rightly Fermenting, or inflamed, it untowardly diſpenſes the Vital Spirit, in the mean time, from the aduſt matter, and Salt too much exalted, it grows more fervent than it ſhould, and more waſts it ſelf.

1. From a good Criſis, the Spirit, tho' made weaker, yet gets the upper hand, wherefore, what is left of the Feaveriſh matter, it by degrees overcomes, and expels; and concocts, and aſſimilates (ſo what is brought be thin or ſlender) the Nutritious Juice: from thence, the maſs of Bloud is amended anew, with Spirit and Sulphur; and the Bloud which now being Salt and ſharp, did continually grow hot, acquires at length a Sweet and Balſamic Nature, and being quickned with a lively motion and heat, rightly performs the offices of life and ſenſe.

2. From a bad Criſis, the buſineſs is otherways, the Liquor of the Bloud (like Wine too much Fermented) degenerates, almoſt into a vappidneſs, or lifeleſneſs; its Spirit is greatly diminiſhed; the Reliques which remain, are intricated, and, as it were, overwhelmed, with the Particles of Aduſt Matter, from whence there is yet a continual growing hot remaining in the Bloud, yet without concoction, or aſſimilation, of the Alible Juice, or ſeparation of the profitable, from the unprofitable: The benign Sulphur, and the Food of the Vital flame, is much conſumed, ſo that the Bloud is leſs inkindled in the Heart, than it ought to be; in the mean time, from the Aduſt Recrements, and alſo the Salt, and Earth being too much carried forth, it perpetually burns in the Veſſels, with thirſt and heat. And becauſe it is dayly depauperated, the Spirit and benign Sulphur being waſted, and more infected, with the Salt, and Earthy dregs being too much exalted, its Liquor in a ſhort time becomes taſtleſs, and is made unfit for circulation, and for the inkindling in the Heart, for the ſuſtaining the Vital fire: wherefore there is a neceſſity that life be loſt, even as the flame of a Lamp is extinguiſhed, when inſtead of the waſted Oil, a Salt and Muddy Liquor only ſupplies it.

3. From

3. From an imperfect and doubtful Criſis, when the ſick being weakned by a long imbeciſity, become not well, but of a long time, the buſineſs is after this manner; The Spirituous and Sulphureous parts of the blood are very much conſumed by the ſlow deflagration; the remaining Liquor, being not purged from the aduſt recrements and feculencies, is rendred very impure; but when there is yet remaining ſomthing of Oil for the Vital Lamp, nor Spirits are altogether wanting, for the ſubduing the Feaveriſh matter, the blood is ſtill circulated, and (though but finally) is enkindled in the Heart; yea, and by little and little the Spirits recollect themſelves, ſet upon the matter remaining of the Feaver, and what they are able, begin to overcome it: then by a pertinacious aſſiduity of coction, like a flame, wavering and half extinct, among green wood, at length riſe up victorious, and reſtore anew, both with heat and motion, leiſurely renewed, a quick and lively Fermentation, in the Heart.

So much in general of the Feaver called Putrid: it remains, before we deſcend to the kinds, and particular Caſes of it, that I recount the ſymptoms and ſigns chiefly notable, in the courſe of this Feaver, and ſubjoin the Reaſons and Cauſes of them, and their manner of being done.

Chap. X.

Of the Symptoms and Signs chiefly to be noted in a Putrid Feaver.

THE Symptoms, coming upon a Putrid Feaver, although they argue the œconomy of the whole Body, to be for the moſt part depraved, and the diſpoſition and Functions of ſome part, or Member hurt; yet, the Accidents, which a Phyſician ought chiefly to conſider, about the Diagnoſis of this Diſeaſe, and its Prognoſis to be rightly inſtituted, may be referred to three claſſes or common places; to wit, they have reſpect to the Viſcera of Concoction, *viz.* the Ventricle, and Inteſtines, with their Appendixes: Or ſecondly, to the Humors, flowing in the Veſſels, *viz.* the blood in the Arteries and Veins, and the thin Liquor in the Nervous parts, together with the chief Springs of either, *viz.* the Heart, and Brain; or laſtly, theſe Symptoms reſpect the habit of the Body, with the various conſtitution of the pores, and the extenſion or emarceration of the ſolid parts. They, who would exactly obſerve the courſe of this Diſeaſe, and would fitly draw out Curatory intentions, may take notice of theſe three heads of Symptoms, and carefully conſider what alterations may happen in theſe; as it were diſtinct Regions, according to the different times of the Feaver.

1. Troubles and Diſorders, ſuch as Nauſeouſneſs, Vomiting, want of Appetite, Indigeſtion, a Looſeneſs, a Scurfineſs of the Mouth and Tongue, a bitter Savour, are wont to infeſt about the Ventricle, and firſt Paſſages, in the whole courſe of this Feaver. Theſe, for the moſt part, are attributed to the humors, firſt heaped together in the Stomach, and there putrefying: But beſides, that the recrements of the Chyle, being throughly roaſted, by too much heat, degenerate into an hurtful matter, very often theſe kind of Accidents happen, for that the Purgings, and the Filth of the Blood and Nervous Juice, while they grow hot, are carried inward, and being depoſited in the membranes of the Viſcera, provoke Convulſions, and alſo make a filthy heap of vicious and very infeſtous humor. I have often obſerved, that about the beginning of the Feaver, the blood growing hot, laid aſide its recrements even inwardly, with a benefit to the ſick, where, although great moleſtations did ariſe about the firſt paſſages, yet the burning was therefore more mild, the Pulſe moderate, and the Urine laudable, and theſe being after this manner in a Feaver, quickly grew well, with a ſlender Diet, and the uſe of gentle evacuations. But if in this caſe I ſhould adminiſter a vehement Cathartic, for the extirpating the humors, that natural purging of the Blood being hindred, preſently the Feaver became ſtrong, with a red Urine, and troubled, a deep Pulſe, Watchings, and other horrid Symptoms; alſo, oftentimes after the ſtate of the Diſeaſe, by this kind of interior Luſtration or Purging, the aduſt matter, and excrementitious, is ſeparated from the Blood. Hence ſometimes a Lask, ſometimes a ſcurfie covering of the Mouth and Throat, follow: Wherefore, there is need of caution, about the Accidents which happen in the firſt paſſages, leſt that whilſt we oppoſe them, we ſhould pervert the motion of Nature; and leſt whilſt we fortifie theſe parts againſt the courſe of the Morbific matter, we untowardly keep the ſame ſhut up in the Maſs of Blood.

The Symptom chiefly to be conſidered, about the bloody Maſs, are, an heat diffuſed through the whole, a burning of the Præcordia, Thirſt, a Diſorder of the Pulſe, a red Urine, a ſpontaneous weariſomneſs, a loſs of all ſtrength, out of which rightly conſidered, theſe things following may be known, *viz.* what the manner of the heat is, or with what tenor the burning blood

flames forth; what time of remiſſion, or of encreaſe its Efferveſcency obſerves in the deflagration; whether it retains its Craſis or Mixture whole; for the burning of it, and circulation of it enkindled, what ſtrength of the Heart will ſuffice, and what ſpace the Veſſels may require; ſo long as the blood burns, what plenty of aduſt recrements it may heap up, by what means it may overcome, ſeparate, or at leaſt endeavour to ſeparate the ſame, and laſtly, what way of a Criſis it endeavors, and with what ſucceſs.

The Accidents which have a reſpect to the thin Liquor, with the Brain, and nervous Appendix, are diſorders concerning Sleep and waking, a debility of the whole Body, a Trembling, Shivering, Pains, Convulſive Motions, Cramps of the Viſcera, Stupefaction, Phrenſie; and the obſervation of which ſuggeſts what the temper and conſtitution of that thin Liquor may be; by what means it waters, and influtes the nervous parts, and performs its Circuits through them; how the Animal Spirits execute the functions of the Viſcera; what the ſtate of the Brain may be, whether it remain free from the incurſion of the Feaveriſh matter, or whether it be not in danger of being overwhelmed, by reaſon of its Critical Metaſtaſis or Tranſlation.

Concerning the habit of the Body, may be obſerved, what may be the reaſon of ſweating, and the manner of it; whether only by vaporous *Effluvia*, or by Sweat, or alſo by little weakes; whether the Fleſh falls away on the ſudden from its wonted bulk; or whether it retains it ſelf a long while; what the colour of the Face is, and the vigor or habit of the Eyes? From theſe well laid together, the courſe of the Feaver may be beſt of all meaſured; at what time it will come to its height or ſtanding; whether Nature will prevail over the Diſeaſe or not; with what manner of ſeparation, and with what ſucceſs ſhe will endeavor the expulſion of the Feaveriſh matter; alſo by theſe ſigns may be learned, by what degrees the blood growing hot, and often congealed, doth tend towards Putrefaction or Corruption; whether it does any thing concoct the alible Juice poured to it; or whether or not it preſently caſts forth of doors all its proviſion by Sweat, as often happens in the declination of this Diſeaſe.

By theſe Symptoms and Signs, a yet more plentiful Indication may be had, if firſt it be known upon what Cauſes the ſeveral Species of them depend, and, by what proviſion they are wont to be raiſed up in our Body: wherefore I have thought it worth our labour to recount particularly the chief of theſe; and to explicate the Reaſons of them, and their ways of working.

But the Symptoms chiefly to be obſerved in a putrid Synochus, or continual fervor without intermiſſions, are, an heat in the whole Body, a ſpontaneous Wearineſs, a burning of the Præcordia, intolerable Thirſt, an Ardor and Scurfineſs of the Tongue, or Jaws, a Pain of the Head and Loins, pertinacious Watchings, Phrenſie, convulſive Motions, a Syncope, Heart-burning, Vomiting, Nauſeouſneſs, a want of Appetite, a Looſneſs, a Flux, with which, not all at once, now with theſe, now with thoſe, this Diſeaſe is wont to be beſet.

1. Heat, which is felt ſharp and biting, in the whole Body, depends upon the too great efferveſcency of the Blood, and the accenſion of it in the Heart; for the Sulphureous or Oily part of the blood being exalted, and taking an heat, is enkindled in the Heart, in a double proportion, more than it was wont; wherefore, it copiouſly diffuſes, by its deflagration, *Effluvia* of heat through the whole Body. When the Sulphur is leſs diſſolved, and enkindled in the Heart, as in the Green Sickneſs, or the white Dropſical Diſeaſe, *&c.* Heat is wanting in the whole; but in a Feaver, when the Sulphur too much burns forth, Heat ſuperabounds. For heat depends not only upon the actual inflammation of the Sulphur, or the firing of it, but an intenſe heat is excited without fire, in many mixtures, where the Particles of Sulphur are diſſolved by corroſion, or are more thickly heaped together for want of ventilation; wherefore, when Iron is corroded by an acid mineral Spirit, or when Spirit of Nitre is poured on the Butter of Antimony, a mighty heat with a Fume is produced; in like manner when Dung, or Hay laid up wet, are kept from ventilation, grow highly hot; it is the ſame reaſon, why the Blood burns above meaſure in Feavers, to wit, the particles of the Sulphur, being too much exalted, and made hot, are more thickly heaped together in the Veſſels, and are more diſſolved, and as it were enkindled by the ferment of the Heart; wherefore, they every way diffuſe heat, being looſned in the bond of the mixture, and every where ſtretched forth or expanſed.

2. A ſpontaneous Wearineſs or Laſſitude is felt in the whole Body; to wit, by reaſon of the Veſſels being diſtented with the boiling blood, alſo the muſculous fleſh is very much ſtuffed with blood, and a copious breath, that it is made leſs fit for motion, as they who are ſick of an Anaſarca, have their Limbs very unwieldy by reaſon of the abundance of ſerous humor; beſides, in Feavers, by reaſon of the inflammation of the blood, the Juice, which is ſent for a ſupply to the nervous ſtock, departs from its due temper, that it becomes little fit for the actuating the Body.

3. The burning of the Præcordia is made, by reaſon of the blood being more copiouſly enkindled in the Chimny of the Heart, which from thence boils forth into the Lungs, with great ardency; wherefore by how much the nearer this Region is to that fire-place of Heat, it is pierced therefore with the greater burning.

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4. An almoſt unquenchable Thirſt is cauſed, both from the glowing heat in the Præcordia, alſo by reaſon of the ſharp and hot particles of the Feaveriſh Matter, affixed to the Ventricle, in the circulating of the Blood; which indeed deſire to be waſhed, even as ſalted and ſpiced Meats, being plentifully eaten, or alſo ſtrong, or ſowr things, rolled in the Mouth or Throat; for this kind of Diſtemper calls for a more free ſwallowing down of Drink, as a Member too much heated, the pouring on of cold water.

5. The Ardor and Scurfineſs of the Tongue and Jaws, as alſo oftentimes an accretion of a certain white, or yellow, or black filth, happen without doubt, becauſe of the Heat and Soot exhaled from the Ventricle and Lungs, burning with heat: but the Tongue grows white, as often as that humidity (with which it is naturally much imbued) is dried up, and parched, and ſo the exterior skin of the Tongue, is as it were roſted, by the burning heat, from hence alſo it becomes ſcurfie; which is alſo ſeen in healthful people, when it happens that the Tongue is ſcorched by Broth, or any other very hot Suppings; in like manner, as when the Tongues of Animals are boiled, for the uſe of the Table, their Skin becomes white and ſharp, or rugged. For whether the Spittle is drawn from the maxillary Glandula's (as the Doctrine of the moſt ingenious *Wharton* hath firſt made known) or any other humor from the Glandula's of the Jaws, or elſewhere; yet becauſe, by reaſon of the heat and drineſs, it grows too thick, and becomes clammy, alſo then the outward skin of the Tongue grows nevertheleſs white; but alſo it is covered with a certain filthy Glew, to wit, becauſe that humor, by reaſon of its thickneſs, may ſmear the Tongue, but cannot wet or moiſten it; but if it happens, that the Tongue is inwardly ſuffuſed with a bilous humor, or outwardly tinged (as comes to paſs by the uſe of Choler-abounding Vomits) then its hairy Nap being ſpongy, imbibing the yellow poyſon, exhibits alſo the like Colour, If that laſtly, the heat be ſo ſtrong, that it burns the Blood, and enkindles a fire, more ardent than uſual, it follows, that from the fire-place of the Heart, the breathing places through the Lungs, ſcarcely ſufficing for the ventilating ſo great fire, ſoot or ſmoak is raiſed up, which being ſmitten to the furnace of the Palat, ſtrikes againſt the Tongue, as it were in a Reverberatory, and infects it with Blackneſs. But this ſame kind of Blackneſs (and as other filthineſſes of the Tongue) is moſt conſpicuous in its middle parts, becauſe the more exterior compaſs is cleanſed by its frequent rubbing againſt the Gums and Palat.

6. Sometimes it happens in Feavers, and eſpecially about their declinations, that the Tongue, Palat, Gums, yea the Cavity of the whole Mouth and Throat, are covered over with a certain viſcous matter, as it were a whitiſh Cruſt; which being often wiped off, preſently new ſprings again; and unleſs by rubbing diligently, and waſhing the Mouth, this cruſty matter be frequently wiped away, the ſick are in hazard of being choaked. This kind of Diſtemper is moſt often excited in Children newly born; for they are wont, for the moſt part, within fourteen days with an external growing hot, to be ſprinkled through the whole skin, with broad and red ſpots; if that this ſuffuſion of redneſs do not freely break forth, or vaniſhes away ſooner than it ought, for the moſt part, this whitiſh Cruſt follows, in the parts of the mouth. This Symptom, when it troubles Infants after this manner, is wont to be aſcribed to the fault of the Milk, to wit, that being too ſharp, it induces the ulcerous Diſtemper of the Mouth. In thoſe ſick with Feavers, it is commonly attribnted to thick Vapors and ſooty, elevated from the Ventricle; But to me it ſeems moſt likely, that in either, this Diſtemper ariſes from the impurities of the whole Bloud (and perhaps in ſome meaſure of the Nervous Juice) depoſited about theſe parts: for, as often as in the maſs of either humor, any extraneous thing intimately mixed, is contained, that it is not to be diſperſed by Sweat, nor eaſily ſent away by Urine, that moſt often is fixed with the ſerous filth abont the Mouth; from whence Catarrhs, Tumors, and troublefom Spittings are cauſed: For when for the chewing of the meats, the Salival humor in this place ought to be plentifully ſuffuſed, Nature very often endeavours to ſend forth of doors what is ſuperfluous, or otherwiſe troubleſome, by theſe uſual ways of Excretion. Hence from Mercury being taken, when both the Bloud, and nervous Juice are abundantly ſtuffed, with its moſt ſmally divided Particles, and endeavour to thruſt them forth, being involved with Serum becauſe they are not able to exterminate thoſe Mercurial little Bodies, being intimately confuſed, neither by Sweat, Urine, or by any other ways, what is remaining, they endeavour to expel through the Arteries and other Paſſages, which ſupply the Mouth with Spittle, the ſame being involved with the ſerous Latex.

Alſo in like manner, in Feavers, when from a long deflagration of the Bloud, the aduſt matter is very much heaped together, of which no ſmall part remaining, after the Criſis, is yet confounded with the Bloud, and Nervous Juice, being fixed either to the Brain, or to ſome other place, from them it is at length ſupped up again, 'tis moſt probable, that this matter is throughly roaſted, by a long Concoction, and ſo becomes almoſt like Glew, thick; wherefore being not able to be diſperſed, neither by Spittle, or inſenſible Tranſpiration, nor to be ſeparated by the Urinary Paſſages, but at length leiſurely runs out by the little Arteries, and other Paſſages of the Spittle, lying open into the Palat, as the moſt uſual way of excretion, and forthwith by reaſon of its thickneſs, grows into that Glewineſs. The ſame reaſon holds

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in Infants, whose blood being made impure, by filths contracted in the Womb, presently it endeavors to purifie it self, by that exterior putting forth, which if it do not rightly succeed, by reason of the thickness of the matter, immediately the viscous impurities are exterminated by this way, as the more open. I have known some, in the declination of a Feaver, to whom, not only this kind of Crust of gummy matter has happened in the parts of the mouth, but a copious salivation, as if they had taken Mercury, with a stinking of the breath, also a swelling of the Tongue and Gums, hath been raised up for many days.

7. The pain of the Head, in Feavers is excited, because the Meninges of the Brain, being pulled or hauled with Vapors, and with a sharp Blood, and hot, for the Blood being impetuously moved, by reason of the direction of the great Artery, is carried in a greater plenty to the Head, than to the lower parts; because the passage from the bosom of the Heart to the Head, is straight, from the same, to the inferior members, oblique, and as it were reflected; wherefore, as the membranes are very sensible, and that there the Blood is stopped, and reverberated, in its rapid course, it is no wonder, if cruel Head-aches are excited in Feavers. Besides, this impetuous flowing of the Blood, wherewith (as it were by a certain Ramming) the membranes of the Head being distended, ake grievously; also sometime, Head-aches arise, by reason of the Nervous Juice (which is supplied from the burning Blood) being too sharp and pricking; wherefore, when the membranes, and nervous parts are watered with the same they being pulled by its acrimony, are moved into Pains and Convulsions.

8. In like manner also, the other Distempers of the Head, as Watchings, Delirium, Phrensie, Convulsion, *&c.* arise, sometimes from the Blood being in a rage, and so stirring up inordinate motions in the Brain, and sometimes also from the nervous Juice being depraved, and therefore made improportionate, to the regiment of the Animal Spirits: But most often, these kind of Symptoms are frequent in Feavers, by reason of the translation of the Feaverish matter from the bosom of the Blood, into these parts. For the Blood, being full of the adust Recrements, remaining after the deflagration, endeavours (like the flowring of new Wine) to subdue, and exclude them from its company, by every manner of way; which, a Flux being arisen, when it cannot expel by Sweat, Urine, or Bleeding, it oftentimes transfers to the substance of the Brain, and there fixes them; and from hence chiefly, the aforesaid Distempers, when they are fixed, and firmly rooted, draw their Original, whenas the lighter, and that are easily moved, often proceed from the afore-recited Causes.

9. Convulsive Motions happen in Feavers, for divers causes; sometimes, because of the matter being heaped together in the first passages, which there hales the membranous parts, with its notable pravity, and then, by the consent of the nervous stock, the Convulsion is presently communicated to the beginning of the Nerves, in the Brain, and by that means draws aside now these, and now those parts: by which means, Worms abounding in the Viscera, sharp Humors being stirred, and strong Medecines, induce Convulsions; Or secondly, when the Feaver is a partaker of some malignity, so in the Small Pox, Measles, or the Plague, frequently Convulsions happen; to wit, because the Blood is altered from its benign and natural temper, into a destroying and venomous, by which the Nerves, and their beginnings are peirced, and forced into Convulsions. Also, oftentimes without the suspition of malignity, in a putrid Feaver, Convulsive motions are induced by reason of the translation of the Feaverish matter to the Brain, as was but now intimated: so I have often observed, when the Disease is not presently cured with the Crisis, the sick lie by it with a tedious sickness, and are made obnoxious to Tremblings and Convulsive motions. Thirdly, and lastly, for the most part in every Feaver, which terminates in Death, Convulsive motions are the sad fore-runners of it; which I think to happen, not only from the malignity of the Matter, with which the nervous stock is pulled and pierced, but because the Spirits, very much exhausted and debilitated, do not sufficiently blow up, and distend the Bodies of the Nerves; wherefore, being released from their wonted extension, and tonick motion, they are however by a more weak endeavor of the Spirits agitated into a disordered motion.

10. A Syncope or Swooning, is wont to be raised up several ways in Feavers; but chiefly for these three causes, to wit, either from the mouth of the Ventricle being distempered, which part as it is interwoven with a manifold texture of Nerves, is very sensible; and because from the same branch of the sixth part, little shoots of Nerves are equally derived to the Heart, and to the Ventricle, if the Orifice of the Ventricle, so implanted with Nerves, be distempered with any great trouble, it is also communicated to the Heart, and either the motion is stopped in it, or at least an inordinate one is excited, whereby the equal Flux of the Spirits and the Blood is interrupted for a time. I knew one in an acute Feaver, taken with a frequent swooning, which distemper wholly ceased, after he had cast forth by Vomit a long smooth Worm. Secondly, a Syncope also is sometimes induced, because the invenomed matter is circulated with the Blood, which suddenly fixes and extinguishes the vital Spirits, and congeals the Blood it self, that it is apt to stagnate in the Heart, as usually happens in the Pest, Small Pox, *&c.* of which we shall speak particularly hereafter. Thirdly, A Syncope is wont to happen,

happen, by reaſon of the more rare texture of the Spirits, which as they are very tender and ſubtil, are eaſily unbent, by any immoderate motion or pain: ſo I have known ſome, who being quiet in bed, have found themſelves well enough, but being removed from one place to another, preſently have ſwooned away.

11. The pain of the Heart happens in Feavers, when the Ventricle, and eſpecially its Orifices, by reaſon of the manifold inſertions of Nerves, being very ſenſible, are beſet with a ſharp and bitteriſh humor, or elſe with an acid, and corroſive; for hence a pain and trouble ariſes from the acrimony of the humor, after the ſame manner, as when the ſphincter of the fundament is afflicted, in Choleric dejections, with pain and moleſtation.

12. By reaſon of the ſame Cauſe, Vomiting, and Nauſeouſneſs, are wont to be excited; to wit, by the Ventricles being beſet, and irritated to a Convulſion, from an extraneous matter, and not akin to it ſelf: Such an excrementitious matter, may be gathered together in the Ventricle, by three ways; for either the Aliments, partly by reaſon of a want of an Acid Ferment, by which they ſhould be rightly Cooked, and partly by reaſon of the burning heat of the Ventricle, are roaſted into ſuch a Corruption; or, Secondly, this kind of matter, is laid up in the Ventricle, from the Arteries, terminating in its Cavity, as uſes to happen in the Small Pox, the Plague, and malignant Feavers; or, Thirdly, meer Choler, being preſſed forth from the Choleduct Veſſels, into the empty Inteſtine, by reaſon of an inverſe motion, and as it were Convulſive, of that Inteſtine, it is poured into the Ventricle, want of Appetite, alſo happens, by reaſon of the Ventricles abounding with vitious Juices, and becauſe the Acid Ferment, is wholly perverted, by the ſcorching heat. Theſe kind of Diſtempers of the Venticle, and Viſcera, ſometimes ariſe from an excrementitious matter, (to wit, alimentous, degenerated in the concoction) heaped together, a long while before the Feaver, in the firſt paſſages, which not ſeldom becomes, the occaſional cauſe, of the Feaver it ſelf: but ſometimes, nauſeouſneſs, want of Appetite, Vomiting, pain of the Heart, *&c.* are the immediate products of the Feaver; for when the day before the ſickneſs, thoſe diſtempered, have been well enough in the Stomack, as ſoon as the immoderate heat of the Bloud was induced, whilſt it boiled up above meaſure, both the *Effluvia*, and the Recrements, being wonted to be evaporated outwardly, alſo the bilous humor, flowing out of the Choleduct Veſſels, are poured into the Ventricle; by which, its Criſis is overthrown; alſo the Reliques of the Chyle, and other Contents in the Viſcera, are egregiouſly depraved; from whence, the aforeſaid Diſtempers draw their Original.

14. No leſs frequent a Symptom in Feavers, is a Diarrhea, or Flux of the Belly, which ſometime happens about the beginning of the Diſeaſe, and ariſes (for the moſt part) either from the Bile, flowing forth of the Choleduct Veſſels, into the *Duodenum*; or from the Recrements of the Bloud, and Nervous Juice, poured forth from the Arteries, and the paſſage of the Pancreas, into the Inteſtines. All the aforeſaid humors, (but eſpecially the Choleric) when they are ſupplied in abundance, often Ferment with the maſs remaining of the Chyme, that the ſame ſwelling up with a ſpumous rarefaction, irritates the Inteſtines, and provokes to the motion of excretion: ſometimes alſo, about the ſtanding of the Diſeaſe, and in the declination of it, a Lask is excited; and ſo, either Nature being Conquereſs, the more thick purgings of the Bloud, are this way critically ſifted forth; or being overcome, the Flux of the Belly, is the effect, and ſign, of the Viſcera wholly loſing their ſtrength, and firm tenour. It ſometimes happens in a Feaver, that the Belly is always bound, that it is not at all looſned, but by Phyſick, and tho' the ſick take nothing but liquid things, for many days, the ſtools are ſtill of a ſolid conſiſtence, and hard, this ſeems for the moſt part to be done, when the Bloud growing ſharply and exceeding hot, like fire, conſumes the humidities, wherever they flow, and draws to it ſelf, out of the Bowels, the watery matter, by a Copious emiſſion of vapours, and preſently makes it to be evaporated outwardly: wherefore, the thicker part, being left in the Inteſtines, is made firm, from the ſcorching heat, as it were a *Caput Mortuum*, remaining after diſtillation.

A Dyſentery is a Diſtemper, ſo frequent in continual Feavers, that ſome years it becomes Epidemical, and not more mild than the Plague, kills many: The cauſe of it is wont to be, not any humor produced within the Viſcera, that corrodes the Inteſtines with its Acrimony, (as ſome affirm) but a certain Infection impreſſed on the Bloud, and ſo intimately confuſed with it, that, under the form of a vapour, or a ſincere humor, it cannot be pulled away from the Bloud: wherefore, the thruſting forwards, towards the Inteſtines, unlocks the little mouths of the Arteries, and makes there little Ulcers, and exudations or flowings forth of the Bloud, like as when from the Feaveriſh Bloud, Puſtles and Inflamations break forth outwardly, with a flowring towards the skin: But it is moſt likely, theſe dyſenteric diſtempers, which accompany Malignant or Epidemical Feavers, ariſe from a certain coagulation of the Bloud, as ſhall be more fully declared hereafter.

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And here alſo, among the ſymptoms of Feavers, might be recited, what are wont to appear outwardly, in the ſuperficies of the Body, as are Spots, Whelks, Buboes, Carbuncles, *&c.* but becauſe theſe belong after an eſpecial manner to a Malignant Feaver, therefore we will forbear in this place, from the conſideration of them, until we ſhall ſpeak of the Plague, Small Pox, the Peſtilential, and Malignant Feaver.

The Pulſe and Urine ſhall conclude here the troop of ſymptoms and ſigns in a Putrid Feaver, which are much heeded, for the finding out, both the ſtate and the ſtrength of the ſick: For, as there are two things, by which our life is propped, *viz.* Heat inkindled in the Heart, and concoction to be made in the Viſcera, and Veſſels, becauſe the Pulſe and Urine, beſt ſhow the alterations in either, induced in a Feaver, therefore from hence, a moſt certain judgment is taken of this Diſeaſe, about to end, in Death or Health. I think it is not needful, to ſpeak of theſe at large, or to recount the ſeveral cauſes and differences of either: It will ſuffice for me to note here, the chiefeſt things of them, and what are worthy of conſideration in the courſe of Feavers. And firſt of all the Pulſe is conſulted, as it were a Thermometer or Weather-Glaſs, conſtituted by Nature, that from thence, the heat inkindled, in a Feaver might be meted; which if it ſhould be more ſtrong, ſtirs up a great ebullition or boiling up of the Bloud, the Artery beats more ſtrongly and quicker, ſo long as the Spirits are in ſtrength; then they being a little exhauſted, the more ſtrong Pulſe is remitted; which however is compenſated with ſwiftneſs, and is made quick, and ſmall. If the Feaver be gentler, and is troubled with a leſſer burning, the Pulſe alſo declines leſs, from its Natural condition, and the moderation of this, in the whole courſe of the Diſeaſe, denotes the truces of Nature. Neither doth the Pulſe only, betray the forces of the Feaver, as of an Enemy, but ſhews alſo plainly the ſtrength of Nature, and her ability of reſiſting. So long as the Pulſe is laudable, the matter goes well, and it ſhews good hopes; but from the evil ſtate of this, a bad omen is ſhewn, and a deſpair of Health. So without a frequent, and diligent examination of the Pulſe, a Phyſician cannot make a right Judgment or Prognoſtication, or ſafely preſcribe Phyſick.

1. As to the firſt thing, it ought to be known (as much as may be) what every ones Pulſe is, according to its Natural Conſtitution; for it is in theſe ſtronger, in thoſe weaker: then it is to be conſidered, in every moment of the Feavers, by what degrees it is diſtant from its Natural ſtate: for now it is ſometimes more vehement, and argues the Feaver to grow ſtronger; now it is depreſſed, below its wont, and denotes the Spirits and Strength dejected.

Thoſe whoſe Pulſe in Health beats weakly and languiſhing, when taken with a Feaver, if they have a ſmall and weak Pulſe, it is not ſo evil a ſign, that we ſhould preſently deſpair of their Health: In whom the Pulſe is by Nature ſtrong and vehement, if after the Criſis of the Diſeaſe, it hath ſcarce a moderate vigour, tho' it be not wholly weak, it argues the condition of the ſick to be ſuſpected, and not ſafe.

If from the beginning of the Feaver, before the Bloud has flamed out, or if a Criſis being made, when part of the burthen is drawn away, or at another time, without an evident cauſe, the Pulſe becomes weak, it portends evilly: but if after long watchings, or great evacuations, the Pulſe is made a little weaker, Health is not therefore to be deſpaired of, becauſe the ſtrength caſt down by theſe means, or overwhelmed, may be reſtored, and the Spirits renewed.

When the Pulſe is ſuddenly altered for the worſe, tho' the ſick ſeem to be better, as to the reſt of the ſymptoms, you may foreſpeak the ſad prognoſtication of Death; and ſo contrariwiſe, altho' moſt horrid ſymptoms urge, and yet the Pulſe is laudable, Health may be yet hoped for. If in a ſtrong man, that hath a Feaver, the Pulſe is very ſmall, and creepingly, or becomes like the motion of Ants, death is at hand.

2. In the exhibiting of Medicines, cautions and rules of no ſmall moment are taken; Purging and Vomiting are forbid, by the pulſe being too quick and violent; alſo by being low and depreſſed; becauſe, whilſt the Bloud is too fervent, evacuation helps little, becauſe both what is hurtful is not ſeparated, alſo for that by the perturbation, the ſtrength or ſpirits, are more debilitated. But when the ſpirits are broken, and ſtrength caſt down, Medicines caſt them more down, and ſometimes wholly overthrows them. Wherefore, when a Phyſician thinks of evacuation, upwards or downwards, he firſt examines the pulſe, and goes about this work only, when Nature is ſtrong and quiet; that ſhe may at once be at leiſure, for the operation of the Medicine, and may have ſufficient ſtrength.

Nor is there leſs need of circumſpection, in ſweating Medicines and Cordials: which, if adminiſtred in the Feaveriſh fit, do too much ſtrengthen, the former violent motion of the Heart, and oftentimes break its ſtrength; alſo, when the Pulſe is very languid, if hot and ſtrong Cordials are adminiſtred, (as when a ſmall flame is troubled with a more ſtrong blaſt of wind) life is eaſily extinguiſhed; wherefore, 'tis a vulgar obſervation, that Cordials often accelerate death, for that by too much troubling the Bloud, they ſooner beat down ſtrength.

There is yet the moſt need of the caution, and direction of the Pulſe, in exhibiting Narcoticks; for theſe, (becauſe they perform their work by extinguiſhing, and fixing the too fierce vital ſpirits) if uſed in a weak or inconſtant Pulſe, either by diminiſhing the vital ſpirits, render them

them wholly insufficient for the Disease, or by suffocating them too much, cause a perpetual sleep: wherefore, in a languid, unequal, or formicating, or creeping Pulse, Opiats are to be shunned, more than a mad Dog or Snake.

An unequal and intermitting Pulse has a most evil Report from the Writings of Physitians; yet, although of an ill note, does not so certainly portend Death, as a Weak Pulse; for I have known many to have recovered, though, by those kind of signs condemned to the grave; because the inordination of the Spirits and the Blood, may be more certainly and easily composed, or allayed, than their dejection restored.

2. The Inspection of Urines in Feavers, before all other Diseases whatsoever, hath more of certainty, and is of greatest use, for from hence, the conditions of the sick, and of the Disease are best known, and the Medical intentions, concerning what is to be done, are better directed; what Observations and Rules concerning this thing, are vulgarly set forth, are so many, that it would be almost an infinite labour and tediousness, to recount them all: it will be sufficient here to note the chief of them.

Concerning the Urines of persons in Feavers, there are chiefly to be considered, the Colour, Consistency, Contents, and Subsidency or Setling. The Colour of the Urine shews the measure or excess of heat in the Blood; which, as it is increased, and becomes more remiss, the Urine also is more or less red; the cause of which is, the ebullition of the Blood, or the Effervescency induced from the Feaver, to the Blood; by reason of which, the particles of Salt and Sulphur, implanted in the Blood, Humors, and solid Parts, are more dissolved, and incocted with the Serum, and impart to it a redness; even as, when Salt of Tartar, and common Sulphur being mixed one with another, and boiled in water, impart a deep red colour to the Liquor.

The Urines of some are highly red, when they are but a little or lightly Feaverish: and on the contrary, the Urines of others, labouring with a Feaverish Burning, are less coloured. Who abound with lively heat, and a very hot Blood, or are obnoxious to the Scurvy, Phthisis, or Hypochondriack Distemper, when by taking Cold, Condensation, Surfeit, or Drinking of Wine, they are troubled by any little Feaver, they render a Urine strongly red; for that the Particles of Salt and Sulphur remain exalted in their Blood, and before half loosned; wherefore there is a necessity, that the Feaver urging, they are more boiled in the Serum; on the contrary, they who are endued with a cold temper, with a faint and weak Pulse, being taken with a Feaver, with a greater effervescency of the Blood, render their Urine less coloured.

The Consistency, Contents, and Subsidency of Urines, being put, as it were, upon the same Thred, depend all of them, on the adust and recrementitious matter, which is remaining in the Blood, after the Feaverish deflagration: if there shall be plenty of this, the consistency of the Urine becomes somewhat thicker, and after it has stood, it is troubled by the Cold; but if there be a lesser quantity of this, or otherwise derived than to the Reins (to wit, by Sweat, or is called away by a critical Translation, to this or that part) the Consistency is made thinner, and the Liquor remains clear. Also the Particles of this Matter do enlarge the Contents of the Urine, which shew themselves diversly, according as the nutricious Juice, is now somewhat cooked, and assimilated by the Blood, now altogether perverted, and carried into a putrefaction, some signs of Concoction and Assimilation shew themselves in the Urines of Feaverish persons, now a laudable Hypostasis, now some Marks and Rudiments of the same. A want of Hypostasis, and the Confusion, and Perturbation of the Urine, denote the Concoction vitiated. But as this Matter is more or less roasted in the Blood, the Contents are now of a pale, now of a red Colour, like Oker. By reason that the recrements, confounded with the Blood, either the Spirit being strong, begin to be overcome, and separated, or the same being depressed too much, they are less able to be separated: also the Contents of the Urine are wont to be more or less, sooner or slower separated from the rest of the Liquor, and to sink down towards the bottom.

As to the Prognosticks, to be taken from the Urine, we may take notice, that the Colour of the Urine being somewhat more remiss, the Consistency mean, the Contents few, the Subsiding free, or easily collected into a Cloud, portend good: on the contrary, a deep red, a thick and troubled Consistency, thick and cloudy Contents, which slowly or scarce at all sink to the bottom, denote a very great Heat, plenty of adust Matter, and its being brought under, and secretion, difficult, or frustrated.

As to the Medicinal Directions, the business depends on this, that we attend, by the frequent inspection of the Urine, the motion of Nature, and be helpful to the same; neither is it to be moved by Purge or Sweat, but when a certain Hypostasis of the Urine shews signs of Concoction and Separation. I thought it needless to say any more here concerning this Matter, because those things are more largely handled elsewhere, in a proper place, which belongs to Urines.

CHAP. XI.

Of the Kinds, and Cure of a Putrid Synochus, or Continual Feaver.

AND thus much for a Putrid Synochus in general, in which is deſcribed its formal reaſon, according to the Accidents and Symptoms which are commonly obſerved in its Figure; there are beſides (I ſhall not ſay Species, but) but ſome Varieties or Irregularities of this Diſeaſe, in which this Feaver ſometimes declines from this common Rule, and by reaſon of ſome accidental Diſtempers, gets new Names and Diſtinctions.

In the firſt place therefore, a Putrid Synochus is wont to be divided into Symptomatick, and Eſſential; It is called Symptomatick, which draws its beginning from ſome other Diſtemper, or Diſeaſe before excited in the Body, ſo that the Feaver is only a Symptom, coming upon that other Diſeaſe: of which ſort is accounted, what depends upon the Squinancy, Pluriſie, the Inflammation, or Impoſthume of the Lungs, or any Impoſthume from a wound, or Ulcer in a principal part, or its Neighborhood, of which we think a little otherwiſe, *viz.* That truly no putrid Feaver is meerly Symptomatical; perhaps it may ariſe occaſionally, from ſome other Diſtemper; but it is founded immediatly, in the Sulphureous part of the Blood being made too hot, and as it were enkindled: for without a Procatarſis, or preceding indiſpoſition of the Blood, the aforeſaid Diſtempers, rarely, or not at all, cauſe a Putrid Feaver.

As to what reſpects the Squinancy, Pluriſie, the Inflammation, or Impoſthume of the Lungs, and the like; I ſay, that theſe are the products of the Feaver, or Diſtempers following it; but by no means the cauſe of it: for moſt often the evident Cauſe, went before, which produced the feaveriſh Effervescency of the Blood, as a taking of cold, evacuation being hindred, *&c.* then, although the ſick do not openly grow preſently into a Feaver, yet a greater ebullition of the Blood, than was wont, is ſtirred up, as may be eaſily conjectured from the Urine, Pulſe, and inquietude of the whole Body. After ſome days (now ſooner, now later) an Inflammation is brought forth in one part or other; the reaſon of which, may probable enough be ſaid to be of this ſort: The Blood, by reaſon of the *Effluvia* being retained (which are like ferment) is increaſed in its bulk, and grows more turgid than its wont, in the Veſſels; and when for want of Ventilation, it is ſtreightned in the ſpace of its Circulation, it eaſily ſprings forth, where it can find a paſſage, through the Arteries, and being extravaſated from the broken Thred of Circulation, it gathers together into a Tumor; and becauſe from this kind of tumor an heat and pain are increaſed in the part, the Blood is more diſturbed in its motion, and ſo the Feaver, at firſt inkindled, is more aggravated.

Further, in theſe kind of Diſtempers, we may take notice of a certain aptitude of the Blood to be coagulated, whereby it is made leſs fluid, ſo that it is apt to be congealed in the leſſer Veſſels, even as it is to be perceived in Milk, when it begins to ſowr, for then it will not be boiled, nor heated over the fire, without coagulation: and in like manner, there is to be ſuſpected in the Blood, a certain diſpoſition to growing ſowr, by reaſon of which, it is made more obnoxious to coagulation; for it eaſily appears, that in a Pluriſie, a Peripneumonia, the Squinancy, and the like Diſeaſes, the Inflammation, or Extravaſation of the Blood, does not always depend on the exuberancy of the Blood, and plenitude of the Veſſels; for oftentimes the Blood is ſtopped in its motion, with a weak Pulſe, and a ſinking down of the Veſſels, and being extravaſated in the ſide, or elſewhere, cauſes a moſt acute pain, yea being driven from one part, by and by it is fixed in another; and ſometimes it begins to ſtagnate in the Heart it ſelf, and there oftentimes induces a deadly oppreſſion: wherefore, ſome pluritical people, are wont, when the pains are gone, to complain of a great burden, and as it were weight, fixed about the Region of the Heart: And when we have opened the dead Bodies of ſuch as have died of theſe kind of Diſeaſes, we have ſeen the Blood to be gathered together, in little bits, or oblong gobbets, in the ſecret parts of the Heart, and round about the cavities of the Veſſels. But for that theſe Diſeaſes are wont to be handled apart from the Feaver, therefore we ſhall ſay no more of them here.

It only remains, that we enquire, whether the Feaver which accompanies theſe Diſtempers, is to be eſteemed in the rank of thoſe that are called putrid, or not? To which we reply, that moſt often they are ſimple Feavers, in which only a ſubtil and ſpirituous part of the Blood is inflamed; and therefore if the extravaſated Blood may be reſtored to Circulation, by a plentiful detraction of the Blood, or an emptying the Veſſels by Sweat, preſently the growing hot of the Blood is appeaſed, and the Feaver ſhortly allayed. But ſometimes, when a prediſpoſition, as in a Plethora, or fulneſs of good humor, or in a great Cacochymy, or fulneſs of evil Juices, brings it on, together with the ſame kind of Diſtempers, a putrid Feaver is inkindled, wholly from the ſame Cauſe.

Among

Among the Symptomatick Feavers, is reckoned that which is commonly called the ſlow Feaver; they who are ſick of this, are more than uſually hot, eſpecially after eating, any motion, or exerciſe; the Urine for the moſt part is red, the Spirits are feeble, and ſtrength caſt down; as to their Appetite and Reſt, they are indifferently well, they have neither Cough, nor much Spitting, but they daily (like thoſe in Conſumptions) grow lean without any evident cauſe. The fault for the moſt part is aſcribed to Obſtructions in ſome Inward (as the Liver, Spleen, or Meſentery) by whoſe default the Aliment is not well Cooked, nor rightly diſpenſed. But it ſeems to me, that this ſort of diſtemper is immediately founded in the evil diſpoſition of the Blood, by which it is inclined into a too ſalt and ſowr temper, and therefore is rendred leſs apt for nutrition and an equal Circulation. For the Blood in the Heart, juſt like Oil in a Lamp, if it redounds too much with ſaline Particles, is enkindled not pleaſantly and equally, but with a noiſe, and great evaporation of the parts; whereby indeed, it is ſooner waſted, and exhibits but a languiſhing and weak flame. I opened one, ſometime ſince dead of this Diſeaſe, in whom the Viſcera deſtinated to Concoction, were well enough, but the Lungs were without moiſture, and dry, and beſet throughout with a ſandy matter like Chalk. Alſo oftentimes, in this Diſeaſe, the Meſentery is beſet, the Glandules being filled with ſuch a Chalky matter: but whether the Blood being made more ſaltiſh, doth firſt bring in theſe kind of Diſtempers of the Viſcera, or whether the Dyſcraſie, or evil diſpoſition of the Viſcera, firſt brings it upon the Blood, is uncertain: it ſeems probable, that either Diſtemper depends upon the other, and that the cauſes of either evil are reciprocal.

Bnt the Feaver, which chiefly deſerves to be called Symptomatic, is that which is excited in Phthiſical perſons, from an Ulcer or Conſumption of the Lungs. For the whole Blood, whilſt it paſſes through the Lungs, in its Circulation, often impreſſes on this Inward, the Idea's of very many Diſeaſes; and on the other ſide, receives the ſame from it, being evilly affected, whatſoever impure thing is contained in the Maſs of the Blood, as the flowring of new Wine, is caſt forth by extremities of the Arteries; wherefore, when Nature being made more weak, it cannot transfer its recrements into the ſuperficies of the Body, it depoſes them by a more near Purgation into the Lungs. From hence a Cacochymia, or fulneſs of ill Juices, and many Chronical Diſeaſes end in a Conſumption: in like manner, when the fleſh of the Lungs waſtes, or abounding with an ulcerous Matter, becomes palf putrid, the Blood paſſing through it, is infected with the purulent matter, or tabid infection, and for that cauſe, is ſtirred up into a continual Efferveſcency, by reaſon of the confuſion of ſomething not miſcible, and wherefore it induces an aſſiduous Feaver, and wholly perverts the Alible Juice. The ſame reaſon is of Feavers, from an Ulcer or Impoſthume, oftentimes raiſed up in other parts; for theſe, even as the tabid conſtitution of the Lungs, cauſe oftentimes a Conſumption and Hectick Feaver. The full conſideration of theſe are not for this place; wherefore we will return whence we have digreſſed, to a Putrid Feaver properly called, or eſſential,

The Eſſential putrid Synochus is wont to be divided into a putrid (ſuch as is already deſcribed) into a Cauſon, or hot burning Feaver; and beſides into a Quotidian, Tertian, and Quartan: The putrid Synochus, but now delineated, ought to be the rule or ſquare of the reſt, to whoſe Type moſt Feavers, which are of this kind, are to be compoſed. As to the reſt, but now mentioned, according as they vary their kind, I ſhall briefly ſubjoin.

The Cauſon, or burning Feaver, is that which performs its courſe with a greater heat, almoſt intolerable thirſt, and other Symptoms, arguing a greater inflammation of the Blood: The formal reaſon of it, by which it is differenced from the reſt, conſiſts in this; that the temper of the Blood is hotter, that is, abounds more with fireable Sulphur; therefore, when it grows fervent, it is enkindled in a greater plenty; and with its deflagration, diffuſes the *Effluvia* of a moſt intenſe heat, through the whole Body: its motion is acute, and quickly comes to its ſtanding; it is compaſſed about with more horrid Symptoms, hath a difficult Criſis, and an even full of danger.

But as to what reſpects thoſe periods or fits, in which a putrid Feaver ſometimes is wont to be more cruel at a ſet time; and (as if intermitting) now every day, now every third or fourth day, repeats as it were the Feaveriſh fit; the reaſon of this ſeems not eaſily to be explicated; eſpecially if we reject from this cenſe the fewer humors, to the ſpontaneous motion of which, this Diſtemper is commonly aſcribed, concerning this matter, what ſeems moſt likely to me, I ſhall doubtingly propoſe. In a continual Feaver there are two chief things (as we have already noted) which for the moſt part induce the Efferveſcency of the Blood, to wit, the exaltation and enkindling of the Sulphureous part of the Blood; then conſequently an heaping together of the aduſt matter, and remaining after the burning of the Blood, to a ſwelling up: upon the former a continuance of the Feaver, upon the other, its ſtanding, and critical perturbations depend: To theſe ſometimes, a certain third thing happens, to wit, a fulneſs, and ſwelling up of the crude Juice, from the Aliments newly taken, which in a continual Feaver (as in the fits of intermitting Feavers) induces a great Efferveſcency at ſet intervals of times. But why this does not always happen, nor wholly after the ſame manner,

the reaſon is this; when the putrid Synochus is very acute, and the whole Blood almoſt is quickly inflamed, and highly rages, whatſoever of nutricious Juice is poured to the blood, is preſently burnt and conſumed by the fire; wherefore little or nothing of it is contained in the maſs of blood, for the matter of a fit. But if this Feaver be leſs acute, and the blood only flames forth moderately, and in parts, the ſupplement of the crude Juice is not wholly conſumed by the burning; but is perverted by a more gentle fire, into a fermentative matter, which, when it ariſes in the Veſſels to a fulneſs of ſwelling up, conceives a Flux, and by its Effervescency, makes ſtronger the Feaveriſh heat, before glowing in the bloud, as it were by the coming of new Fewel. The flowring of this matter doth not ſeldom begin with a light ſhivering, or cold, and ſometimes end with ſweat; but for the moſt part, it is exhaled by inſenſible tranſpiration. In every fit, beſides the proviſion of the degenerate nutricious Juice, ſomething from the aduſt, and burnt matter of the blood, evaporates; wherefore the Criſis of the Diſeaſe is drawn forth longer, that 'tis hardly cured, under eleven or fourteen days; yea (for the moſt part) in this ſort of Feaver, with fits and remiſſions coming between, the perfect Cure of the Diſeaſe happens ſcarcely within twenty days; and ſometimes leiſurely, without any through Criſis, it remits, and then by a long declination, it is ended in Death, or Health.

But that this kind of remiſſion and acerbation or growing more violent, are varied, according to the type of an Intermitting Feaver, that they repeat their turns now every day, now every other day, and ſometimes not but within four days, the reaſon of this is to be ſought, from the Doctrine before delivered, of Intermitting Feavers; to wit, that according as the Dyſcraſie of the Blood diverſly appears, the ſupplement of the degenerate nutritious Juice, ariſes to the fulneſs of ſwelling up, either ſooner or later; and for that reaſon, its Effervescency cauſes now more frequent, now more rare fits in this Feaver.

Concerning the Cure of putrid Feavers, of every kind, there are four general intentions, on which the whole ſtreſs of the matter depends.

Firſt, That the Blood (if it may be done) may be defended from burning, and the flame, or fire enkindled in its Sulphureous part, be wholly ſuppreſſed; which about the firſt beginning of this Diſeaſe, happens to be brought often about.

Secondly, That when the Blood having taken fire, cannot be preſently extinguiſhed, that at leaſt it may perform its burning more mildly, and with leſſer hurt.

Thirdly, The deflagration being ended, that the Liquor of the Blood be freed from the recrements of the aduſt and burnt matter, and afterwards reſtored to its natural Temper and Vigor.

Fourthly, That the Symptoms chiefly troubling may be timely helped, the which, unleſs taken away, will fruſtrate the work both of Nature and Medecine.

As to particular Remedies, with which theſe intentions may be ſerved, there are various preſcriptions, and forms of Medecines, not only among Phyſicians, but alſo among old women and Emperics, ordinarily in uſe; from which, however, like a Sword in a blind mans hand, uſed without difference, and exact method of healing, more hurt than good, moſt often accrues to the ſick. There will be no need here to repeat the forms of Purges, Cordials, and of other Medecines, elegantly enough delivered among many Authors: I will add in few words, ſome chief indications, and Medical Cautions, which ought to be obſerved in the courſe of this Feaver, according to its various times, and divers ſymptoms.

1. At the firſt beginning of this Diſeaſe, the buſineſs will be, that the Feaver may be preſently ſuppreſſed; and the inflammation of the heated Sulphur may be inhibited; to which, the opening of a vein doth chiefly conduce; for by this means, the Blood is eventilated, and the heated Particles, too much heaped together, and almoſt ready to be fired, are diſſipated one from another: as when Hay, apt to burn, if expoſed to the open Air, its firing is prevented. Beſides, let a ſlender Diet be inſtituted, in which nothing Spirituous or Sulphureous ought to be adminiſtred: The Viſcera, and firſt Paſſages ſhould be freed from the load of excrementitious matter; wherefore Clyſters are of neceſſary uſe; ſometimes alſo Vomits and gentle Purges; by which, ſometimes timely and with Judgment adminiſtred, the Feaver preſently after the beginning, is extinguiſhed, the food of the fire being drawn away. If that notwithſtanding this method the burning ſpreads more abroad, and more and more, daily ſnatches hold of the Sulphureous Particles of the Blood; it muſt be endeavoured (as much as may be) that the deflagration proceed gently, without great tumult.

2. When the Feaver is augmented, if the Blood be too hot, and diſtends the Veſſels very much, with a vehement and ſtrong Pulſe; if Watchings, a Phrenſie, or a pain of the Head cruelly urge, the letting of Blood may be again repeated; Tranſpiration (as much as may be) ſhould be freely procured; wherefore let the ſick keep in bed for the moſt part; let the Diet be ſparing, of the moſt ſlender Aliments, alſo Drink ſmall, and plentiful, that the burning blood may be diluted with a more plentiful Serum: Clyſters are adminiſtred ſafe enough, and in truth commodiouſly; but Medecines, whether Catharticks, or Diaphoreticks, and which too much exagitate the Blood, are to be ſhunned, with the ſame induſtry, as Blaſts of Wind to burning Houſes;

Houſes; but rather Opiats, and Anodines which fix and bind up the Blood and Spirits, are to be made uſe of; alſo Juleps and Decoctions, which refrigerate the burning Viſcera, attemper the Blood, and cheriſh the Spirits, are often to be exhibited; acetous Liquors of Vegetables, or Minerals, alſo putrified Nitre, becauſe they reſtrain the rage of the Blood, and extinguiſh Thirſt, are truly convenient. Hot Waters, and Spirits, Cordial, and Bezoartick Powders (ſo long as the Diſeaſe is not malignant) are not to be medled with. If that the Blood be unequally circulated, and is carried more towards the Head, than the Feet, Epithema's are Profitable, of the warm Fleſh, or Inwards of Animals, applied to the Soles of the Feet.

3. When the Feaver is at its ſtanding, the motion of Nature is diligently to be attended, whether it will make a Criſis or not; wherefore nothing raſhly is to be attempted by the Phyſitian; the opening a Vein, or ſtrong Purgation, is wholly to be forbid; but after that the Feaveriſh burning is ſomewhat remitted, from the deflagration of the Blood, and ſigns of Concoction appear in the Urine, if that the motion of Nature be ſlow, a Sweat, or gentle Purge may be admittted; which however, are better and ſafer done by the Phyſician, when Nature firſt, by a critical motion, hath entred upon the ſecluſion of the Morbifick matter. If that all things are crude, and troubled, the Urine yet turbid, without ſediment, or ſeparation of parts, if the ſtrength be languiſhing, the Pulſe weak, if there be no Criſis going before, or only in vain, any evacuation, either by ſweat or Purge, is not to be attempted, without manifeſt danger of Life, but it muſt be longer ſtaid for, that the Spirits of the Blood may recover themſelves, may by ſome means overcome the excrementitious and aduſt matter, and then by degrees may ſeparate it, and put it forth; in the mean time, the Spirits are to be cheriſhed, with temperate Cordials, the immoderate Efferveſcency of the Blood (if it ſtill be) is to be ſtopped, and its due fermentation ſuſtained, which in truth is beſt performed by Corals, Pearls, and ſuch kind of Powders; which indeed are diſſolved by the Ferments of the Viſcera, and then ferment with the Blood, and greatly reſtore its weak and wavering motion. In the mean time (whilſt Nature is labouring) all obſtacles and impediments are to be removed, and eſpecially the proviſion of Excrements, heaped up in the firſt paſſages, is to be brought away, by the frequent uſe of Clyſters.

4. By what way or method, the Symptoms chiefly urging, ought to be handled, will not be eaſily preſcribed by certain Rules; becauſe they themſelves require ſometimes to be preſently appeaſed and qtieted, and ſometimes to be quickned forward: and what is ſomething more; perhaps at another time, they are to be left wholly to Nature. Some of theſe are to be oppoſed with gentle and lenitive Remedies, but others with more ſharp and irritative Phyſick: yet in the mean time it is a precept to be held in all, that you diligently wait upon the footſteps of Nature; which if it works wrongfully, its diſorder is to be reduced; if rightly, yet too vehemently, to be bridled: If ſhe works rightly, yet too ſlowly, or more weakly than ſhe ſhould, the buſineſs will be, that her endeavour may be incited, and helped, by the help of Medecine.

5. In the declination of the Feaver, when after a perfect Criſis, Nature is ſtronger than the Diſeaſe, the buſineſs goes well, nor is there much buſineſs left for a Phyſician: It only remains to propoſe an exact manner of Diet, that the ſick may ſoon recover ſtrength, without fear of relapſing: alſo it is requiſite to exterminate the Reliques of the feaveriſh matter, with a light Purgation. About Diet, they often fall on the Rock of Relapſing, *viz.*, by the too haſty eating of fleſh-meats, or more ſtrong food, the ſick relapſe into the Feaver; for when the Viſcera are weak, and the Aliments (unleſs very ſlender) not eaſily digeſted, and when alſo the diſpoſition of the Blood is weaker, that it does not aſſimilate the more ſtrong nouriſhing Juice, if any thing improportionate is brought to either, the Regiment of Nature is again perverted, and all goes ill. Wherefore, thoſe growing well, ſhould for a long time refrain from fleſh, and when at length they uſe it, it ſhould not be unleſs the Urine ſhall be like that of healthful people, and no more troubled by the cold; and then indeed it will be ſafeſt to begin with Broths made of Fleſh, and then by degrees, to proceed to more ſtrong Aliments.

6. When from an imperfect Criſis, things are grown doubtful, and remain yet undetermined; then is the Phyſicians moſt difficult Task: The motions and ſtrength of Nature are carefully to be waited on, whether it begins to prevail on the Diſeaſe, or to yield to it: If ſigns of concoction appear, and that there is ſtrength, a gentle evacuation, and only by leiſure, is to be celebrated. In the mean time, the Symptoms moſt urging are to be ſuccoured with convenient Remedies, all impediments to be taken away, and ſtrength is to be ſuſtained (as much as may be) with Cordials, and a right manner of Living or Diet.

7. When from an Evil, or no Criſis, all things turn to the worſe, and when the Phyſician almoſt deſpairs of curing the Diſeaſe, he may predict its event ſuſpected, and much to be feared. But yet, he ought not to truſt to a naked Prognoſtication, to hinder all things elſe, but that as yet, what is in the Medical Art, ſhould be conſulted for health, though deſperate: Remedies may be adminiſtred to the Symptoms moſt infeſting; the Spirits of the Blood almoſt extinct, may be reſtored by Cordials. When we deſpond of Health, Life ſhould be prolonged as long as it may, and at leaſt a fair Exit procured.

According

According to the various types but now deſcribed, of a Putrid Feaver, I might readily add very many Hiſtories of ſick people, and particular obſervations, made about their Cure; for for theſe kind of Examples are uſually met with in our daily practice, ſo that they are ſufficient to fill a great Volume; out of theſe however, with the good leave of the honeſt Reader, I will briefly propoſe ſome few, reſpecting the ſeveral kinds of the aforeſaid Feaver, by which their Doctrine, and Method of healing them, above delivered, may be illuſtrated.

A Noble Matron, about fifty years of Age, of a ſlender habit of Body, litlte ſtature, indued with a ruddy complexion, when on the fifteenth day of *June*, by reaſon of the Summers heat, ſhe had put on more thin Garments than ſhe was wont, felt her ſelf ill in the Evening; from thence ſhe was diſtempered with a nauſeouſneſs, and oppreſſion of her ſtomach, ſhe felt wandring pains, troubling her now in her ſhoulders, now in her back, very thirſty, yet without any immoderate heat: on the ſecond, and third day, almoſt after the ſame manner, on the fourth day after a Vomit, *viz.* of the infuſion of *Crocus Metallorum*, one Ounce given, ſhe caſt forth yellow bile four times, and had three Stools, and ſeemed to be eaſed, the night following, ſhe ſlept ſomething better: but on the next day, the Feaver being throughly inkindled, ſhe complained of thirſt, a burning of the Præcordia, and of a pain, now in her ſide, now in her back; preſently blood was taken to eight Ounces, her Urine was of a very deep red, thick, and troubled without any Hypoſtaſis, or ſetling of the Contents, her Pulſe unequal, and often intermitting, the following night without ſleep: on the ſixth day of the Diſeaſe, early in the Morning, a ſmall Sweat broke forth, from whence the heat ſomething abated, which in the Evening again grew ſtronger: on the ſeventh day, a very acute heat, with thirſt, burning, an inordinate and intermitting Pulſe, as alſo with a mighty reſtleſneſs, and toſſing of the whole Body troubled her, on the eighth the ſymptoms were ſomewhat more remiſs; alſo in the Urine, ſome marks of an Hypoſtaſis; ſhe took that day Poſſet-drink, with Meadow-ſweet boiled in it, and ſweated plentifully; and was cured of her Feaver. All the time of her ſickneſs, for Food they gave only ſmall Beer, Poſſet-drink, Barly-Broth, or Grewel, alſo frequently Clyſters; Drink, and a cooling Julep, they gave her at her pleaſure.

This Noble Lady, through tranſpiration being hindred, fell into a putrid Synochus: the *Effluvia*, wont to be evaporated through the Skin, being retained within (together with the Choler flowing out of the Choleric Veſſels) and fixed to the Viſcera, did overthrow the diſpoſitions of their parts, and eſpecially gave trouble to the Stomach, and raiſed up pains and Convulſions in the parts filled with Muſcles and Membranes: the Pulſe was unequal, and intermitting, not becauſe of the malignity of the Diſeaſe, as in the Plague, but by reaſon a certain proper diſpoſition of the Heart, by which indeed, its ferment being not well conſtituted, the Blood growing fervent, is not preſently equally enkindled, and wholly leaps forth, but a part of the Blood, in flowing in a ſmall, then a greater, and after ſome turns, the greateſt proportion, ſtopping for a moment of time, in the boſoms of the Heart, produces the unequal or intermitting Pulſe. I have known in many others, clearly, the like Diſtemper of the Pulſe; to wit, ſo long as they were free from intemperance, the Pulſe was altogether equal and orderly, but if they were more ſtrongly heated than uſually, by any ſudden paſſion of the mind, or too great agitation of the Body, , preſently they were affected with an unequal Pulſe, and between the vibrations or ſtrikings, intermitting perhaps 4, 7, 10, or 20. and as often as they fell into a Feaver, the Pulſe ſhewed it ſelf after this irregular manner. When this habitual irregularity concerning the Pulſe, was not yet made known to me, by frequent experience, I was wont to ſuſpect ſtill a malignity in the Diſeaſe, and to foretel a fatal event, which happened otherwiſe.

On the fifth day, in this ſick perſon, the Feaver, although ſlowly enkindled, came to an augmentation, and from thence paſs'd through the reſt of the ſtations with a ſwift motion; on the ſixth light emptying of the aduſt matter, ariſing to a fulneſs, a Sweat being riſen, and ſo a certain remiſſion of the Feaveriſh heat followed: on the ſeventh day, this aduſt matter ariſing to its height of increaſe, made the ſtanding of the Diſeaſe, to which, at length on the eighth day, a plentiful Sweat, with all things requiſite to a good Criſis, followed, and perfectly cured the Feaver: becauſe (as it ought to be) thoſe three things went before this critical evacuation, *viz.* firſt a full and ſufficient deflagration of the Blood, as appeared by the very ſtrong heat, and plainly fiery, continued for three days before; alſo ſecondly, a congeſtion of the aduſt matter to a plenitude, as was collected by the high diſquiet and toſſing about the preceding night: and then a certain Pepaſmus or Concoction of the ſame matter, and a begun ſecretion in the Blood, which a ceaſing of the Symptoms and Signs of Concoction in the Urine, ſhewed; wherefore, the copious Sweat, coming upon ſo laudable a ſign, ſo long as there was no ſuſpition of malignity, portended nothing but good.

About the beginning of the year 1656, a Gentleman endued with an active habit of Body, without any manifeſt cauſe (unleſs that being much addicted to ſtudy, he uſed no exerciſe after it) became ill; at firſt he complained of a nauſeouſneſs and want of Appetite, with a great Head-Ach, on the ſecond day he was affected, now with a ſhivering, now with heat, ſeveral times reciprocating, beſides, with thirſt, and burning of the Præcordia, with a ſcurfineſs of the Tongue,

Tongue, and an ingrateful ſavour. On that day, he took ten drams of an Emetick Liquor, by which he vomited ſeven times and caſt up a great quantity of yellow bile, and had four Stools; the night following he was unquiet, and almoſt wholly without ſleep, and in which the ſick perſon grew more Feaveriſh, with an increaſed heat: on the third day, when the aforeſaid Symptoms were grown worſe, he was let blood to ten ounces; his Urine was red, thick, and with a copious ſediment; his Pulſe quick, and vehement; at night he ſweat a little with a ſhort ſleep, but diſturbed: on the following morning, he ſeemed to be a little eaſed; yet in the evening all things grew worſe, with moſt ſtrong wakings, heat, and thirſt: on the fifth day, by a light Sweat, the heat ſomewhat remitted, which yet a little before the Evening, returned with its wonted fierceneſs. The Night again was wholly without ſleep, with a continual toſſing up and down of his Body. In the Morning, by a little gentle Sweating, he felt a little eaſe; in the Evening an increaſe again of all things more cruelly; the night alſo was very unquiet: about the beginning of the next day, a Sweat, as before ſucceeded, and a little more plentifully: on this day was a manifeſt change towards Health; the heat and thirſt was a little leſs vehement, his Urine was leſs red, with ſome Hypoſtaſis; thence, for three days, the Feaver leiſurely declined; yet every night he had a certain fit, but more remiſs than before; on the eleventh day, he ſweated more plentifully, and was perfectly cured: all the time of his Sickneſs, he uſed a moſt ſpare diet, taking truly nothing of Aliment, beſide ſmall Beer, and Poſſet-drink made of it; he ſometimes took Drink and cooling Juleps of boiled Barly, and diſtilled waters; daily, if his Belly was not looſe of it ſelf, an emollient Clyſter was adminiſtred: he uſed no other Phyſick beſides, no wit, neither Purge nor Cordial. But the Feaver being allayed, he was twice Purged, and from thence quickly well.

This Feaver was a putrid Synochus, as may be conjectured by the ſhivering about the beginning, and then with continual heat, thirſt, watchings, and other Symptoms grievouſly infeſting for many days: but foraſmuch as its intemperature was exaſperated every night, it might be called a continued Quotidian This Diſeaſe made its firſt aſſault without any evident cauſe, becauſe the Blood being little ventilated, like Wine growing hot of it ſelf, had conceived an ardour, from the exalted Sulphur; the Choler flowing forth from the Choleduct Veſſels, and likewiſe the Purgings of the raging Blood, being poured about inwardly (as it is wont to do for the moſt part in Feavers) preſently ſtirred up troubles and diſorders in the firſt paſſages; therefore by reaſon of the excrementitious matter there heaped up, there was procured a depletion, and ſoon after the beginning, a Vomiting: notwithſtanding which Evacuation, and likewiſe a more ſtrong purging of the Belly by Stool, if adminiſtred, the Feaver being wholly inkindled, becauſe they too much agitate the Blood, and diſturb greatly the Concoction of the aduſt feaveriſh matter, for that reaſon bring more dammage for the moſt part, than benefit to the ſick: The firſt ſtation of this Diſeaſe, *viz.* until the whole Blood was fired, was extended to the third day; and then from thence, when the Blood flaming forth, was burdened with aduſt recrements, its greater ebullition, with a frequent endeavor of expulſion by Sweat, followed, on the ſeventh day, when the Blood for the greateſt part had flamed forth, and the aduſt recrements, heaped up in its boſom to a fulneſs of ſwelling up, began to be troubleſom, the critical motion was ſtirred up; by which nevertheleſs, that matter not being as yet wholly ſubdued, nor ready for ſeparation, the Diſeaſe was not perfectly cured; but after another period, the ſame increaſing, at laſt being ſtirred up, on the eleventh day, brought on that other, and perfectly curing ſwelling up: in the days between, becauſe, beſides the recrements remaining after the deflagration of the Blood, and reſerved for a Criſis, alſo from the Nutritious Juice not preſently taking fire, but after a peculiar manner depraved, other matter in the boſom of the Blood, apt to a ſwelling up, was gathered together; therefore, from the continual increaſe, and Flux of this, there hapned to this Feaver continual fits (ſuch as are wont in intermitting Feavers) on ſet days and hours.

A ſtudious young man, about twenty five years of Age, of a dark Countenance, and Melancholic temper, without any manifeſt occaſion, began to be ſick, in the Year 1656. At firſt he complained of a Feaveriſh Diſtemper with thirſt, a ſpontaneous wearineſs, and want of Appetite; moreover, on the ſecond day, of a pain in his right ſide, and a diſtention of either Hypochondrium, alſo with almoſt continual Vomiting, Wakings, and very great pain of the Head; a Phyſician being ſent for, he was preſently let Blood to twelve ounces. In the Evening he grew more hot, and was light-headed; afterwards, a Sweat, though ſmall ſucceeding, he was better the next Morning: on the fourth day again, he caſt up whatever he took preſently; alſo he was troubled with an almoſt continual endeavour of Vomiting. The exhibition of a Vomitory Medicine, propoſed by the Phyſician, both the ſick perſon, and alſo his Friends, taught by the danger of it before, rejected. From a Clyſter given him, he had ſix Stools, and ſeemed to be a little alleviated; alſo the night following he ſlept ſomewhat: on the fifth day he again fell into frequent Vomiting, with intolerable Thirſt; he burnt inwardly, but outwardly could not be felt any immoderate heat; becauſe the recrements of the effervent Blood, which ought to exhale through the Skin, ſeemed to ſtagnate within, and to

flow

flow forth into the Viſcera. Therefore in the evening this Bolus was given him, to provoke Sweat. Of Conſerves of Roſes Vitriolate one Dram, of *Gaſcon*'s Powder one Scruple, of Laudanum ſoluted in Balm-Water one Grain: that night he ſlept moderately, and by a copious ſweat following, the Symptoms ſeemed to be mitigated: nevertheleſs on the ſixth day, all things again were imbittered, and a through heat, thirſt, and burning of the Præcordia, cruelly tormented him; on the ſeventh and eighth day, the Puſe was unequal and diſordered; for the moſt part he talked idly, and if moved in his Bed, he fell often into a Swoon. On the ninth day, the ſame Symptoms ſtopped, alſo he was troubled with a contraction of the Tendons in his wriſts, and convulſive motions of other parts, that we almoſt deſpaired of Life. Becauſe that morning Nature ſeemed to be given over as conquered, ſhe was now to be ſuccoured, with whatever remained of Art: Wherefore intending a more copious Sweat, as the laſt Refuge, I gave him a Dram of Spirit of Harts-horn, at one time, in a ſmall draught of Cordial Julep; upon which, being for four hours very unquiet, and furious, he could ſcarce be held in his Bed: but afterwards Sleep creeping upon him, he ſweat very much, and the buſineſs ſuddenly came to be out of all danger. On the following night, for the continuing of the Sweat, I ordered to be given him, every ſix hours, a doſe of the Powder of Contrayerva, the Feaver, and the Diſtempers of the Nerves ſhortly ceaſed, and the ſick perſon became well.

This Feaver, as to the manner of its Figure, may be called a putrid Synochus; which, in this ſick perſon, from the Blood being made hot of its own accord, like Hay heating, and ſo conceiving an immoderate Fermentation, took its original: by reaſon of the Melancholick temper of the Blood, the heat was leſs ſtrong, although the Symptoms were otherwiſe worſe, and happened to be chiefly inimical to the nervous ſtock; for the Blood burning forth, as Fire in a Furnace, covered with Chips, glowed with a moſt inteſtine burning; therefore the ſick complained of the heat of the Præcordia, with an intolerable thirſt, when in the mean time, the exterior parts were but little heated: for this reaſon, and becauſe the Body was leſs perſpirable, the aduſt recrements of the Blood being about to make a Criſis, and which were wont to be diſperſed outwardly, at ſet times, being ſuffuſed inwardly (Nature being very much oppreſſed, and perpetually provoked) brought on cruel, and almoſt continual Vomitings; wherefore, when the Feaveriſh matter was derived to the firſt paſſages, by ſo frequent an endeavour of its expulſion, before the fulneſs, or concoction, no Criſis followed thereupon. Nor was the ſick man the better for that irregular evacuation; yea, the Blood being ſtill made worſe in its mixture, began to be corrupted in it ſelf, and wholly to pervert the Nervous Liquor; from whence, beſides the aſſiduous Vomitings, frequent Swoonings, inequal Pulſe, alſo Deliriums, and Convulſive Motions did ariſe; but foraſmuch as the mixtion of either humor and diſpoſition, being not yet wholly looſned, or overturned, the Diaphoretick was adminiſtred, which by reaſon of its great agility, quickly paſs'd through both the Blood, and the Nervous Liquor, and a lively and haſty Fermentation being raiſed up anew, carried forth of doors their impurities and extraneous mixtures; the ſtate of the Diſeaſe tending towards Death, was reduced to Health, and by this means, inſtead of a Natural Criſis, by the help of a ſupplying Medecine, the ſick man, as it were recalled from the dead, quickly recovered Health.

A Woman, being about thirty years old, of a ſtrong Body, and Melancholick temper, (as might be gathered by her very auſtere manners) in the third month after her lying in, got cold in giving her Child ſuck, and uncovering her ſelf, and upon it fell preſently into a ſhivering. To this, a heat more increaſed than uſual, followed, which afterwards (a light Sweat ariſing) quickly remitted. On the ſecond and third day, ſhe was very thirſty, and without appetite to Food, yet without immoderate heat, that ſhe could ſcarce believe her ſelf in a Feaver: She lay quiet every night, but wholly without ſleep; her Urine was highly red, and with the multitude of Contents, thick and cloudy, which however not troubled by the Cold, remained ſtill after the ſame manner, without Hypoſtaſis, or ſinking down of the parts. On the fourth day, the heat was inkindled throughout the whole; wherefore a Phyſician being then firſt ſent for, about 12 ounces of Blood was taken from her Arm; after the letting of blood, and her Belly the ſame day copiouſly emptied, by a Clyſter, in the evening ſhe fell into a Sweat, by which nevertheleſs ſhe was nothing eaſed, and (though an Anodine Medecine was given her) ſhe wore out the whole night (as before) without ſleep. On the fifth day, from a Clyſter being given, ſhe had three Stools, and felt ſome eaſe: her Urine ſtill remained red and troubled; when Blood was preſcribed to be taken from her Ham, the ſick obſtinately refuſed, eſteeming her ſelf to grow well: on the following night, when ſhe had lain long without ſleep, and unquiet, ſhe at length was troubled with a fit, ſuch as is commonly called Hyſterical, after a grievous manner; and at firſt, with a certain numneſs or ſenſe of pricking poſſeſſing the extream parts of her body (eſpecially her feet, thighs and legs) ſhe was affected; and together with a Wind cruelly diſtending the Inteſtines, Ventricle and Hypochondria; ſhe felt in the bottom of her Belly, as it were a certain bulk to creep upwards, which when it had aſcended to the Heart, and thence to the Brain, the ſick Woman preſently was weakned in her Intellectuals, and all the night lay talking extravagantly and idly. On the ſixth day, after her Belly was taken down by a Clyſter, ſhe returned to her ſelf, and remained

remained in her right mind, and ſeemed to be indifferently well. But in the Evening when ſhe was moved in her bed, ſhe began to feel the ſame kind of fit as before, to wit, ſhe had a ſenſe of pricking, as if ſtung with Nettles, in all her body, together as it were a round thing rouling about in her belly, which creeping upwards, diſtended the Inteſtines and Ventricle, that ſhe emitted by means of it blaſts, and belchings: for eaſe ſake, ſhe required a draught of cold Water. Moreover, the Remedies uſual in hyſterical Diſtempers, as Caſtor, the ſmell of *Aſſa fœtida*, the fume of burnt Feathers, Ligatures, and Frictions of the Legs, and the like were adminiſtred, by the uſe of which, ſhe ſeemed for the preſent, free from the aforeſaid Diſtemper, and was wholly without it for four hours: but when ſhe lay upon her back in her bed, as ſhe had ſetled her ſelf to ſleep, on a ſudden ſhe complained, that the ſame Symptoms, did at once run through her whole Body, and by and by, ſhe fell upon it into a Delirium; houling and crying out, ſhe talked idely the whole night; the day following, her eyes being open, ſhe lay without ſpeech or motion: again in the Evening, when her Feaver being increaſed, ſhe grew furious, that ſhe could ſcarce be held in her bed: and ſo ſhe remained for three days, now delirious, crying out, and wailing, now as it were ſtupid, without motion, or voice; yet ſtill ſhe was tormented with Convulſive motions, about the tendons of the muſcles: on the tenth day, ſhe drew her breath deep, and difficultly, with a weak, and as it were a creeping pulſe, and about the middle of the night died.

This Feaver was of the rank of the Putrid Feavers, which nevertheleſs, by reaſon of the melancholic diſpoſition of the Bloud, (as we before intimated) was not very grievous, with heat or burning; but yet being very much infeſtous to the Brain, and nervous ſtock, was more difficult to be cured: The Bloud being prediſpoſed to a growing hot, eaſily contracted the Diſtemper by taking cold, but yet, from the ſalt, and earthy feculencies, together with the Sulphur being moved, it was not openly inflamed; nevertheleſs, burning with an inteſtine, and as it were ſhut up fire, it was more notably depraved: Hence, preſently from the beginning, the Urine was highly red, and troubled, alſo ſhe continued wholly without ſleep: on the fifth day, the Bloud burning forth, and being filled with the recrements, or aduſt matter, was irritated by its plenitude to an endeavor of excretion; wherefore, this night, a ſwelling up being ariſen, it transferred its load, not diſperſable by ſweat, into the head, and there affixed it to the Brain, and nervous ſtock: From thence, preſently, the wonted irradiation of the animal Spirits, being diſturbed in the fountain it ſelf, their inordinations firſt hapned to be felt in the extream parts; wherefore, there was a pricking in the whole Body, the Belly inflated, the Hypochondria diſtended, and as it were a certain ſubſtance, or live thing, aſcending upwards, and ſucceſſively running through the Belly, Precordia, and at length the Head: For theſe kind of Symptoms, ariſe not (as it is commonly believed) always from Vapors, lifted up from the Womb, and ſtriving or thruſting upwards: but, not ſeldom, from the Brain, and the beginning of the Nerves being diſtempered: for, when the evil is there inflicted, that the animal Spirits nigh their origine, are diſturbed in their motion, neither (as before) blow up, and diſtend the nervous Bodies, preſently the other Spirits, implanted in the extremities of the Nerves, being deprived of their wonted influence, begin to tumultuate, and being moved inordinately, and towards their beginnings, cauſe Convulſions in thoſe parts in which they dwell. This irregular, and Convulſive motion, begun in the extremities, by the continued paſſage of the Spirits, and of the nervous parts, creeps by and by into other parts, and then to others, ſtill to thoſe nearer to the Brain, till at length, (the whole ſeries of Spirits, like Souldiers, being carried ſucceſſively backwards) the Convulſions are continued, into the fountain it ſelf of motion; So as in truth, by this means, the Convulſive motions, are ſometimes begun, a moſt long way, from the cauſe, or place of the Diſtemper, as by this only argument plainly appears: to wit, as often as the influx of the animal Spirits, is inhibited in the Leg, or Arms, by a ſtrict Ligature, or by leaning hard on them, a ſenſe of pricking, or a cramp, with a numneſs, is felt, firſt in the Foot or Hand, which afterwards ſucceſſively aſcends towards the affected part: wherefore, in this ſick Woman, by reaſon of the Feaveriſh matter, (to wit, the aduſt recrements) fixed on the Brain, by a critical tranſlation from the boſom of the Bloud; and there beſetting the beginnings of the Nerves, thoſe Symptoms, imitating the hiſterical diſtemper were ſtirred up: by reaſon of the Nerves, (which are diſperſed through the whole Body, by means of the Spinal Marrow) being diſtempered near their original, the ſenſe of pricking begun in the extream parts, by and by is perceived in the whole. By reaſon of a like hurt, of the ſixth pare in the fountain, Convulſions and Diſtentions ariſe, firſt in its little branches, moſt thickly ſet about the Abdomen: That aſcent, as it were of a certain ſubſtance, was only a tumefaction of the Viſcera, and Muſcles, ſucceſſively inflated or blown up, by the Convulſion; from thence, the ſame Diſtemper (by the mediation or coming between of the branch of the ſame ſixth pare) creeping along more upward, and ſtill more near the Brain, the Precordia, and then the Head it ſelf, (as by a certain Vapor raiſed up from beneath) ſeemed to be taken; on the next day, when this Feaveriſh matter, at firſt lightly fixed in the Brain, was at length again amended by the Bloud, the aforeſaid Symptoms ceaſed for a time: Then ſoon after (the Bloud

again flowing, and depoſing its Recrements again in the Brain) the ſame kind of Diſtemper as before, this ſick Woman felt to come upon her; which however, with rubbings, the ſmell of ſtinking things, and other Remedies uſed in the hiſterical paſſion, was retarded for four hours, from its aſſault; to wit, foraſmuch as the animal Spirits, being tyred out by the external object, and irritated into a violent motion, were hindred, that they could not ſo ſuddenly conceive Convulſive motions: but afterwards, when that incitation of the Spirits, outwardly exhibited, did ceaſe, the morbific cauſe ſtill troubling, thoſe Spirits being grievouſly beſet, not ſucceſſively (as before) beginning at the extremities, but on a ſudden, all, both in the Brain, and the nervous appendix, were at once acted into confuſion. The Criſis being after this manner attempted, *viz.* By the tranſlation of the Feaveriſh matter to the Brain, the event of the Diſeaſe, both in this ſick Woman, and alſo in others, whoſe ſickneſſes I have diligently obſerved, for the moſt part hath a mortal ſucceſs. For the Bloud, unleſs extreamly depraved, and hindred, ſcarce ever endeavors to purifie it ſelf, by ſuch a Criſis: and as often as it endeavors an excretion by this means, it inflicts on the Brain, and nervous ſtock, an evil, not quickly, nor eaſily to be blotted out: alſo, the maſs it ſelf of the Bloud, very rarely, by the motion of ſuch a flowring, is rendred free, from the impure mixture of the Feaveriſh matter.

A learned young man, of a lean habit, and pale countenance, in the coming in of the Spring, being conſcious of no error as to his dyet, began to complain of a wearineſs, and impotency in walking, alſo of a drouſineſs, and ſleepineſs of his head: on the ſecond day alſo, he was tormented with thirſt, want of appetite, and an heat of his Precordia: on the third day, the Phyſician being ſent for, he took a Vomit, by which, when he had Vomited three times, and caſt downwards five times, cholerick and hot matter, he became ſomewhat chearfuller, and the night following ſlept indifferently well: on the fourth day, he bled a ſmall quantity; then his thirſt, and heat very much increaſed: his Urine was red, with a copious ſediment, and a little hypoſtaſis. But becauſe, after the ſigns of concoction in the Urine, the endeavour of Nature, as it were oppreſſed, appeared for ſeparation, without ſufficient evacuation, therefore he was let Bloud to ſeven Ounces, and he ſeemed thereby to be very much eaſed, yet in the evening, all things grew worſe, and then for three days, the Feaver ſeemed ſtill to be increaſed: on the ſeventh day, he complained of a great heavineſs in his head, and of a darkneſs, turning about in his eyes: after noon, an hemorrhage or bleeding copiouſly followed, that for the great loſs of Bloud, the ſick perſon had almoſt loſt all his ſtrength, and there was a very great neceſſity of medicinal help to ſtop the Bloud: For this end, when a Vein in his Arm was opened, Ligatures, and proper Medicines were applied, both to his Head and Belly, and very many other Remedies, (the occaſion of haſty curing urging) preſcribed by every body, were tryed in vain; at length, by the perſuaſion of a Woman, coming there by chance, a red hot Iron was held to his bleeding Noſe, and on a ſudden, from the Vapour of the burnt Bloud, received into the Noſtrils, its Flux was ſtayed. This Remedy, I afterwards knew uſed to many, with very good ſucceſs. This great Hemorrhage cured the continual Feaver, to which nevertheleſs, an intermitting Quotidian followed, which afterward was quickly cured, by the method of curing already delivered.

This Feaver, beginning without any manifeſt occaſion, and continued for many days with thirſt, and heat, may be called a Putrid Synochus; which yet without any horrid Symptom, about the beginning or ſtanding, was cured by an eaſie courſe, tho' at length by a dangerous and difficult Criſis: The turgeſcency of the Bloud in the Spring-time, and together the defect of ventilation in the ſame, gave the beginning to this: The Bloud burning out, with a Feaveriſh fire, about the fourth day, had heaped up ſomething of aduſt matter; that flowring it attempted a critical motion, tho' with a ſmall hemorrhage: The defect of a more full evacuation, the opening of the Vein ſupplied for a time, afterwards, the aduſt Recrements being heaped together, in great plenty, the ſame being not apt to be diſſipated by ſweat, in a body not rightly perſpirable, at the time nature was about to endeavour a Criſis, a mighty bleeding followed. For when the Bloud, by reaſon of the ſecluſion of the Feaveriſh matter, is agitated with a critical motion, very many of its Particles are looſned from the mixture, ſo that a greater ſwelling up being provoked, they carry forth every extraneous thing confuſed with them: if at this time, the breathing places of the skin, be but little open, the maſs of the Bloud (as new Wine ſtopped up in a bottle of a ſmall mouth) even more notably grows turgid, and becauſe it cannot ſhake off the Feaveriſh matter, by ſweat, it carries it ſelf forth of dores, together with it, any way it can find; wherefore, when there lies a moſt eaſie paſſage, for the boiling Bloud, through the veſſels opening into apertures of the Noſtrils, from that Port (like the ſame new Wine when the veſſel is opened) being inlarged by a ſpumous refraction, it abundantly leaps forth. The continual Feaver being cured, by this means, an intermitting Quotidian followed, becauſe after a long deflagration of the Bloud, and great loſs of it, what Bloud was remaining, being very much deprived of Spirit, and the Salt, with the left Sulphur being throughly roaſted, eaſily contracted that kind of diſpoſition, whereby it was apt, not rightly to concoct the alible juice, but to pervert it into a matter very fermentative.

A Matron

A Matron, about ſixty years of age, when ſhe had ſat up a certain night, going to bed in ſheets, not throughly dry, began to be ill; at firſt ſhe was troubled with a ſuffocating Catarrh, that by reaſon of the ſerous deluge, falling on the Sarynx, ſhe could hardly breath; neither could ſhe ſleep; the next day with a nauſeouſneſs, and want of Appetite, with ſome little exceſs of thirſt and heat: on the third day, an acute pain invaded her in her ſide, with a Cough, and the Feaver increaſed: her Urine was red, and clear, with a laudable Hypoſtaſis, an unequal, and an intermitting pulſe. A Phyſician being ſent for, ſhe was let Bloud to ten ounces, alſo that day, her belly was copiouſly looſned by a Clyſter: About night the pain vaniſhed, and ſhe ſlept indifferently: her Urine was then red, troubled, and full of contents: on the fourth day, the Feaver was ſomewhat increaſed: In the evening troubled with a Cough very much, and by and by following thereupon the acute pain (as before) in the ſame ſide; her Urine being again clear, with an Hypoſtaſis: Her pain, from her being let Bloud again ceaſed; on the fifth day, the Feaver was more remiſs, but at night ſhe was unquiet with heat, and a toſſing up and down of her body, but without pain. The next morning ſhe ſweated plentifully, and was eaſed; then uſing ſtill a ſlender dyet for ſome days, and being once purged, ſhe grew well without relapſing. It is worth obſervation, that whilſt the pain troubled her, the Urine was clear, and with an Hypoſtaſis, nor troubled by the cold; which however, the ſame being allayed, became preſently thick, more red, and filled with contents.

This Diſeaſe, becauſe of the acute pain in the ſide, as it were a Pathognomic ſign, might be called a Pluriſie: but we have here a Feaver, preceding the pain, and not the product of it; The evident cauſe of the ſickneſs was Tranſpiration being hindred by the conſtriction of the pores; The Bloud growing hot, by reaſon of the *Effluvia* being retained, and alſo too much abounding with a ſerous latex, as it were vomiting very much of it, from the Arteries terminating in the Larynx, cauſed the ſenſe of the ſuffocating Catarrh: For this kind of Diſtemper (as alſo the Cough with great ſpitting) ariſes not, for that the watery humor (as is commonly ſaid) falls from the head, into the throat, and lungs; but becauſe the ſerous Latex is poured forth, now from the pneumonic veſſels, immediately into the lungs, now dropping forth from the Arteries opening into the Larynx, falls down on the breaſt; on the third day, from the ſame ſerous humour, with a portion of the Bloud, being fixed in the ſide, the acute pain aroſe; for the Bloud beginning to grow fervent, when as yet it did contain in it ſelf a crude matter, and (as it ſhould ſeem) ſomething ſour, from the degenerate alible juice, depoſed the ſame, (becauſe it could not caſt it forth of doors by ſweat) by a proper luſtration or purging through the intercoſtal Arteries, into the Membrane ſurrounding the Ribs; and there (as it is always wont in a Pluriſie) either by coagulation, (which may be lawfully ſuſpected) or by the ſhutting up of the veſſels, the Bloud being intangled with the ſame matter, is ſtopped in its motion; then being increaſed in its bulk, by a new coming ſtill of the Bloud, it cauſes a break of the union, and ſo an acute pain. That in this ſick Woman, the ſame kind of matter, diſturbing the maſs of Bloud, with a portion of it extravaſated, was fixed about the Pleura, it from thence hapned, becauſe the pain urging, the Urine was clear, and not full of contents: then when the veſſels, by reaſon of Phlebotomy, being emptied, they ſupped up again that matter, into its maſs, before exterminated from the Bloud, the Urine preſently became troubled, and again big with contents: The pulſe was unequal, and intermitting, becauſe of the idiocraſie or proper diſpoſition, which ſhe was wont to have in every intemperature: for when I cured this Woman of a Feaver, many years before, her pulſe being unequal, and intermitting, had ſtruck a fear in me, and others, of a ſad preſage, concerning the event of the Diſeaſe, which however at that time, (as alſo in this ſickneſs) ceaſed, proſperouſly, and without any horrid Symptom.

A ſtrong young man, and corpulent, after immoderate Exerciſe, about the Summer ſolſtice, and then a ſudden cold coming upon the heat, found himſelf ill: At firſt, a want of Appetite, nauſeouſneſs, and cruel pain of the head, as alſo thirſt, and a more intenſe heat than uſual troubled him; on the ſecond day, an acute pain invaded him on his right ſide with a Cough, and difficult breathing; Bloud being preſently taken plentifully from the Arm of the ſame ſide, that pain remitted ſomewhat, which yet in the evening returned, being made more cruel by a Cough, and bloudy Spittle. The night followed, without ſleep, and very unquiet: on the third day, he was again let bloud, beſides Liniments and Fomentations were applied to his ſide; Moreover, Pouders, Juleps, and anti-pleuretick Decoctions, being taken inwardly, about night the pain almoſt wholly ceaſed. Then by and by, he was afflicted with a cruel Head-ach, and a Vertigo: on the fourth day, a ſtream of Bloud fell from his right noſtril, about two ounces, by which the pain of his Head clearly ceaſed, and the Vertigo; but in the Evening, the pain in the ſide before diſtempered, returned with greater fierceneſs: In the mean time his Pulſe was ſmall, and weak, that when it was conſulted upon, for the letting him bloud again, 'twas thought dangerous, leſt his dejected ſtrength would not admit of ſuch Remedy: wherefore, Phlebotomy was performed only, in a very ſmall quantity, and a Fomentation, and a Cataplaſm was preſcribed to be diligently applied to his ſide; beſides twenty drops of the Spirit of Harts-horn, to be taken in a

ſpoonful of Cordial Julep, and the ſame to be repeated continually, within the ſpace of ſix hours: He ſweat that night very much, and the pain much remitted, his ſpitting was but little, interſperſed with Bloud, which, within a day wholly ceaſed, and the pain alſo leiſurely vaniſhed. The ſick man took twice a day, a ſcruple of the ſame Spirit of Harts-horn, and within a few days, he grew perfectly well, without relapſing.

This Feaver was a ſimple Synochus, ſtirr'd up from the evident cauſe, *viz.* a Conſtriction of the Pores: as ſoon as the Bloud began to be ſomewhat filled with the aduſt Recrements, and ſo to ſwell up more, the matter, which ſhould have been ſeparated, by reaſon of its peculiar evil, was tranferred into the Pleura, and being there fixed, compelled the Bloud coming to it, to be coagulated, and therefore to be ſtopped in its circulation, and (when it could not be received by the Veins) preſently to be extravaſated: from hence hapned the acute pain in the ſide, and bloudy Spittle, by and by, after the beginning of this Diſeaſe; then afterwards, the ſame matter being thruſt out of that neſt, which it had got, and being ſupped up again into the maſs of Bloud, was fixed in the head; and there inducing the like ſtagnation of the Bloud, and (as it is probable) coagulation, cauſed the Vertigo, and cruel pain; which nevertheleſs was quickly cured, by the hemorrhage being ariſen, by reaſon of the extravaſated Bloud. A part of the morbifick matter, being after this manner drawn away, the other part reſumed by the Bloud, was again conveyed to its uſual neſt, to wit, the ſide before diſtempered; where depoſiting its Latex, (to wit, a portion of the Bloud) it did coagulate it again, and compelled it to be extravaſated, or to flow out of the Veſſels: For that pain being renewed on the fourth day, with the bloudy Spittle, from the ebullition of the Bloud, too extreamly, and therefore flowing out of the Veſſels, would not be brought away; becauſe at that time, the Pulſe was ſmall and weak, with a falling down of the Veſſels, that indeed the Bloud was thought to have been run all out of the Veſſels, for that being coagulated by the morbific matter, (and therefore tho' expulſed the Arteries, yet not being able to be carried back by the Veins) it was ſtopped in its circulation. Upon this, an acute pain followed, becauſe the Bloud being heaped together by its frequent approach, and elevated into a Tumor, made a diſſolution of the union; alſo, by and by from the beginning, a bloudy Spittle came upon it, becauſe the Bloud being reſtrained within, in the Body, ſomewhere in its motion, by reaſon of the moſt tender, and eaſily opening little mouths of the Veſſels, ran forth into the Cavities; when to the ſame outwardly extravaſated, by reaſon of a more thick skin, and the mouths of the little Veſſels being locked up, no way lay open, unleſs by its being made and ripened into an Impoſthume. The opening of a Vein profited in the beginning of the Pleuriſie, becauſe it reſtrained the Bloud, ſomewhere hindred in its circuit, from too great effervescency; but eſpecially, for that, when the Veſſels were by that means greatly emptied, they did again receive, and render fluent, whatſoever humors were before exterminated, and alſo the Bloud beginning to ſtagnate in the diſtempered part. Alſo, the Remedies helping moſt, about the beginning of this Diſeaſe, were of that ſort, which hinder the coagulation of the Bloud, or diſſolve it in the coagulating; ſuch they are, which abound very much with a volatile, or an alchaliſate Salt: to wit, Spirit of Soot, of Bloud, Harts-horn, alſo Spirit and Salt of Urine, the Pouder of the Claws and Eyes of Crabs, of a Boars Tooth, or the Jaw of a Pike, are of known uſe. Among the Common People, it is a cuſtom to drink an Infuſion of Horſe-Dung; which Medicine indeed, I have known often to have brought help, in deplorable caſes. In the mean time, all acid things whatſoever, becauſe they more coagulate the Bloud, and hinder expectoration, are highly hurtful in this Diſeaſe.

Chap. XII.

Of a Malignant or Peſtilential Feaver in general.

Beſides the continual Feaver, which is already deſcribed, and which ariſes from ſome principle of the Blood being too much carried forth, there is another ſpecies of this, which is ſtirred up, by reaſon of the Bloud being touched with ſome invenomed Infection, and therefore liable to enter into various coagulations, and corruptions: In which, not only the Spirit and the Sulphur, as in a Putrid Feaver, rage, and compel the Bloud to grow immoderately hot, but beſides, the mixture of the Bloud is preſently diſſolved, and its liquor goes into parts; and ſo moſt horrid Symptoms, with manifeſt danger of life, are induced in this ſort of diſtemper. Under this rank, we comprehend Malignant, and Peſtilential Feavers, the Plague, Small Pox, and Meaſles: of which we ſhall ſpeak preſently.

Peſtilential

Peſtilential Diſeaſes, wander ſo in the dark, and have an unknown original, that their cauſes, and beings are ſeldom explicated, without having a recourſe to occult qualities. By the unanimous conſent of all, the ſtrength, and power of theſe are placed in an invenomed matter; becauſe we perceive, from a peſtilent diſtemper, ſtrength ſuddenly to be overthrown, and life quickly deſtroyed, no otherwiſe than from the drinking of Poyſon. And therefore, for the explicating the nature of the peſtilence, it will not be beſides the matter, firſt, to enquire concerning Poyſon in general, and by what means it diſtempers our Bodies, then to ſhew what ſort of Poyſon is ſprinkled in the Plague, and contagious Diſeaſes: which being performed, we will treat particularly of the Diſeaſes but now recited.

Every thing deſerves the name of Poyſon, which ſtriking into our Body, after an occult manner vehemently hurts the temper, and actions of any part, or of the whole, profligates the Spirits, or perverts their motions, ſolves the mixtures of the Liquors, and induces Coagulations and Corruptions, deſtroys the functions and ferments of the Viſcera, and ſo ſuddenly and hiddenly brings life into danger. Of theſe, which after this manner lie in wait for us, there is a mighty plenty, and very rich proviſion in the nature of things: oftentimes they are inwardly begotten within our body; outwardly they are abundantly ſupplied from every Coaſt, and out of every tract of Earth, Water and Air, theſe daily ariſe out of the diſtinct families of Minerals, Vegetables, and Animals, and ſo mingle themſelves with our Food, yea, with our Medicine, that we may complain with *Pliny*, *Quod non ſit fateri, an rerum natura largius mala, an remedia genuerit.* That it was not known, whether Nature had begot greater Evils, or Remedies.

As there is great varieties of Poyſons, ſo, as to their Subjects, and ways of hurting, there is no leſs diverſity of them: for the moſt Poyſons, in their whole ſubſtance are ſaid to be contrary to us, that whatſoever they come to, with a burning force, and like fierce fire, they reduce into aſhes, yet out of theſe, ſome being noted for a peculiar raiſing of hurt, do more endammage one one part or ſubſtance than another. The Subjects, on which the taint of Poyſon, is next and more immediately inflicted, are twofold; to wit, the animal Spirits, or the ſpirituous ſubtil Liquor flowing in the Brain, and nervous ſtock; and the Bloud flowing in the Veſſels, and Heart, when the object is carried only to one, or being improportionate, at one to either, that from thence, the diſpoſition of the Liquors, or of the containing parts, is overthrown, whereby the neceſſary functions, for the performing of life and ſenſe, are reſtrained, and this done latently, and as it were unforeſeen, theſe kind of Diſtempers, we aſcribe to Poyſon.

The nervous Bodies, with the animal Spirit, are not invaded wholly after the ſame manner, by every ſort of Poyſons; for they are tormented, now with a Stupor, now with Convulſions, and thoſe of divers kinds and manners: The Bile of a Tarantula, cauſes dancing: A Power ſent from the Torpedo, by the Angle, or lines of the Net, ſtupifies the hand of the Fiſher. The Roots of the Wild Parſnip, or the Seeds of Lolium or Darnel, being eaten, make men mad: Opium, Mandrakes, Henbane, and the like, cauſe deep, and ſometimes deadly ſleep. Theſe and many others, chiefly impreſs their Poyſon, on the ſpirituous or animal faculty, without any great perturbation of the Bloud, or hurt brought to the heart.

There are alſo ſome Poyſons, which moſt of all inſinuate their malignity, to the maſs of Bloud; wherefore, from ſome Medicines, there have been produced, a yellow or black Jaundice, ſometimes a Leproſie, or leprous diſtempers, and ſwellings of the whole body, vapours breaking forth from ſecret hollows of the Earth, alſo from Coals newly inkindled, often ſuffocating the vital Spirits, at once congeal the Bloud, and ſtop it in its motion, whereby the flame of life in the heart, could not be continued. How much corruption of the maſs of Bloud is imparted from the peſtilent Infection, is perſpicuous to every one, from the Spots and Whelks, which are as it were the marks of the blaſted Bloud.

If the hurt, being firſt inflicted to either, *viz.* The regiment of the Heart, or Brain, be more lightly made, it is for the moſt part cured, without any great offence to either; wherefore, Convulſive Motions, Stupefaction, Lethargy, Melancholy, Paralytick Diſtempers, do not ſeldom begin with a laudable Pulſe, and without an immoderate effervescency of the Bloud; and then, if the diſtemper does not get ſtrength, leiſurely end, and ceaſe. There are other Poyſons, which often deprave the Bloud, and by diſſolving its mixture, corrupt it, in the mean time the animal functions remain whole enough. But if the ferment of the Poyſon be ſtronger, and hath more deeply fixed its roots, preſently the Poyſon is diſperſed, from one Province to the other: for when the nervous parts ſwell up, with a virulent juice, a portion of the Poyſon, is carried with the nervous Latex returning through the Lymphatick Veſſels, into the Veins, eaſily into the boſom of the Bloud, and infects its maſs, with the evil with which it was big: alſo, from the Bloud being grievouſly impoyſoned, the juice, by which the Nerves are watered, quickly contract the infection; hence mad men are in a Feaver, and thoſe taken with a peſtilent Feaver, are moſt often tormented with a Delirium, or Phrenſie. Concerning theſe things, we muſt conſider, what the alteration is, or the impreſſion of hurt, which is inflicted from the Poyſon, to the animal Spirit, with the brain and nervous appendix; and what alſo, to the Bloud, with the Heart and the annexed Veſſels: tho' here, it is not in the power of humane skill or wit, plainly to ſhew, or

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as it were point out with the finger the manner of its being done; yet we may be able to attain to some little knowledge of this thing, by reasoning, and by comparing it, with other distempers.

Concerning the former, we shall observe, that the subtil Liquor, or animal Spirits, wherewith the Nervous Bodies are blown up, and by whose expansion, sense and motion perform their reciprocal actions, are easily perverted from their tensity, and equal expansion: for as the Nerves are of a soft texture, and the Spirits which abound in them of a very subtil substance, they cannot endure any strong or vehement objects; wherefore when any violent or improportionate thing falls on them, they are often compelled from their expansion, and excursion into slight, and a running backward, and not seldom into irregularities of motions: wherefore sudden passions of the mind distract them, and drive them into Spasms, and Convulsions; when the Alible Juice, by which they are repaired, is supplied too sharp, sour or austere, they suffer now Palsies, and now Contractures: If that some object more incongruous, (such as we have affirmed Poyson to be) should be offered, whose Particles are indued with such fierceness, or are of such a kind of configuration, that when they grow impetuously hot with the Nervous Liquor, they shake or lose here and there its more subtil or spirituous part, or wholly drive it away, and fix the remaining Liquor either with a styptic force, or by ebullition, force it into inordinate motions; hence of necessity, evil distempers of the Brain, and Nervous parts arise, *viz.* sometimes a Convulsion, Trembling, Shivering, sometimes loosnings, or a stupefaction, and other symptoms of more grievous note. What things after this manner infect the Nervous Juice with Poyson, are now more thick, and only when they are applied in a very Corporeal substance, do inflict their hurt; now they are thin, and being resolved, even into a vapour or breath, pour forth from a certain little prick, the ferment of Poyson, through the whole Nervous stock. Sometimes the Poyson of some hurtful thing, being eaten, first begins its Tragedy in the Ventricle; more often by a naked touch, leaves on the superficies of the Body, a virulent taint, which easily and quickly with its ferment, contaminates the Spirits, dispersed through the whole. The Infection, whereever inflicted, either within or without, is more largely dispersed from the extremities of the Nerves, by their easie passage, being from thence brought into consent of the evil, by the very many little shoots of the same branch. Often a more light touch of an invenomed thing, by the finger, or extremity of any other member, presently communicates to the Brain, the received infection, and from thence it is retorted into the whole Body, and the fartheſt members; the reason of this is, that both the Particles of the Nervous Juice, and of the same invenomed infection, are so light, and ready for motion, that they pass through most swiftly, as the Rays of light through a Diaphanous medium, the whole mass of one another.

2. As often as the Bloud contracts hurt from some Poysonous thing, the Poyson is fixed within; either slow, and of lesser activity, which does not presently betray it self, nor break forth into cruel symptoms, till of a long time after, it is ripened by a silent fermentation, and hath first infected the whole mass of Bloud, as may be observed in some Poysons, which are said to kill at a distance, and not till after some months or years. Or the Poysons inspired into the Bloud, are imbued with a much more acute sting, that from their Contagion, the Infection contracted, presently breaks forth into cruel symptoms, and thereupon follows now a Feaverish effervency with Vomiting, Thirst, and burning of the Precordia, now a swelling up of the whole Body, a discoloration of the Skin, oftentimes a breaking forth of Whelks, and Buboes, and frequently also a sudden loss of all strength, so that sudden death, without tumult, and almost insensibly steals upon one: where by the way it is to be noted, If the Spirits of the Bloud, provoked by the enemy, are able to encounter him, and to strive for the victory, this Feaverish ebullition of the Bloud is stirred up from the conflict; but if the Particles of the Poyson, being far stronger, suddenly profligate the Spirits of the Bloud, and extinguish life, presently the bloudy mass is corrupted, neither can it be circulated in the Vessels, nor rightly inkindled in the heart.

If it be yet demanded, what mutations, the Bloud infected with Poyson, undergoes, either in its substance, or consistency, that, for that reason it is rendred unfit for the sustaining of Life? I answer after this manner; Some Poysons fuse the Bloud, and too much precipitate its serosity, such are Medicines, which by a strong killing Purging, or by a *Profluvium* of Urin, or a discoloration, or swelling up of the whole Body, or with an eruption of Pustules, cause a very great secretion of the serous Latex; in the mean time a great ebullition of the mass of Bloud is induced, whereby the Vital Spirits are greatly destroyed, the Particles of Salt and Sulphur too much exalted, by the concoction, and are often so roasted, that a Yellow or Black Jaundice is caused.

There are Poysons of another kind, far more dangerous, which congeal the Bloud, and by destroying its mixture, corrupt it, *viz.* the first induce a congelation to the bloudy mass, and then a Putrefaction: for when the Spirits of the Bloud, being overthrown, by the contagion of the Poyson, are dissipated, the equal mixture of the Liquor is loosned; wherefore the more thick Particles mutually infold one another, and (like Milk, when Rennet is put to it, or growing sowr of it self) are coagulated apart: hence the Bloud curdles in the Vessels, that it is less

leſs readily circulated in them: coagulated portions of this, being inwardly diluted, into the boſom of the heart, are apt to ſtagnate there, and ſo to bring forth frequent ſyncopes and ſwoonings: being carried outwardly, and in the circulating, fixed in the skin, ſometimes being more plentifully heaped together, they induce a ſuffuſion of blackneſs through the whole, ſometimes being more ſparingly diſperſed, they cauſe only ſpots, or Purple marks, like black and blue ſtroaks, and other appearances of malignity. But the coagulation of the Bloud, quickly diſpoſes it to putrefaction or corruption; as is ſeen in extravaſated Bloud, which is wont to grow ſoon black and putrid. For the Spirit being exhaled, the Particles of Sulphur and Salt remaining in the Bloud, begin to go apart one from another, and to break the bond of the mixture, from whence follows Putrefaction.

Theſe things being thus premiſed of Poyſon in general, the reaſon of the method requires that we enter upon the handling of Feavers, which draw their Original, altogether from a malignant, and invenomed infection: and as under this title, the Peſt or Plague eaſily obtains the chief place, I will begin with its conſideration, and afterwards, I will ſpeak of Malignant Feavers, Small Pox, and Meaſles, in order. But yet, before I ſhall propoſe its definition, I will briefly inquire, of the peſtiferous Poyſon, what its Diſpoſition and Nature may be; alſo, from whence it may be born; and laſtly, by what means it is propagated into others, by contagion.

For the expreſſing the Nature of the Plague, Authors are wont to chuſe ſome invenomed Bodies, and from their Names, to frame an Elogy of this moſt wicked Diſeaſe; wherefore in the definition of the Peſt, are commonly recounted the Nepelline, Aconital, and Arſenical Poyſon: the Lethiferous force of which however, as it conſiſts in a very thick matter, and does not exert or put forth it ſelf but by a Corporal contact, doth not truly imitate the eſſence of the Peſtilential Diſeaſe: for this is founded in a Spiritual and Vaporous Infection, by which its *Effluvia* being every way diffuſed, ſo potently unfold themſelves, that out of the beſt ſeminary or ſeed-plot, they quickly propagate a fruitful Crop of Death and Deſtruction. By reaſon of its notable activity, this Infection may deſerve to be called, as it were a certain quinteſſence of Poyſon; the very agil and ſubtil Particles of this, do penetrate all Bodies, and inſpire them with its ferment: for either being diſperſed through the Air, or hid in a certain tender or cheriſhing neſt, tho' they ſtrike againſt the humane Body but lightly, and as it were through a Caſement, they eaſily ſubdue it; for both the Animal Spirits, and thoſe of the Bloud, they quickly infect, and by that means, ſhortly pour forth the venomous taint, into all the members.

When a Peſtilential Breath or Vapour, hath invaded any one, and that Poyſon hath firſt laid hold on the Animal Spirits, or thoſe of the Bloud, or both of them at once, (as hath been already ſaid of Poyſons) the taint is quickly derived from the ſubtil and more thin ſubſtance of theſe, into a more thick matter: becauſe it quickly ferments the whole Maſs of Bloud, or of the Nervous Juice, and the Excrementitious Humors, every where abounding, and from thence is deduced into the ſolid parts, and fixes the evil in them. If this Diſeaſe, firſt poſſeſſes the Animal Spirits, preſently the hurt is communicated to the Brain, and the Nervous ſtock, and eſpecially to the Ventricle, forthwith it impoyſons the humour growing in theſe; looſens its mixture, perverts the regular motion, and renders it wholly incongruous and infeſtous to the more tender ſubſtance of the containing parts: by and by from thence, Cramps and Convulſive Motions, cruel Vomitings, pains of the Heart, alſo Phrenſies, Deliriums, or pertinacious Watchings, are ſtirred up, about the firſt aſſault of the Diſeaſe: when in the mean time, the infection not being yet diſperſed through the Bloud, the ſick are not Feaveriſh, nor are troubled with inordinate Pulſe, or Syncope, or appearances of marks; which ſymptoms however ariſe afterwars, as ſoon as the Bloud is infected. If when the Spirits of the Bloud are firſt poſſeſſed, with the impoyſoned infection, either drawn in with the Air, or attracted through the Pores, its ferment is preſently diſſipated through the whole Maſs of the Bloud, the infeſted portions immediately begin to be looſned from their equal mixture, to go into parts, and to be coagulated, and the ſame, being delated, into the boſom of the Heart, are wont there to ſtagnate, and ſo to induce a Syncope, Swoonings, and often ſudden Death; alſo being carried outwardly, fixed about the skin, to cauſe Buboes, inflamed riſings, and other marks of Poyſon; in the mean time, the ſick appear well in mind, nor are they troubled with Delirium nor Convulſive Motions. If that from a more ſtrong cauſe, the hurt is inflicted to both parts at once, the courſe of the Diſeaſe is performed with a more horrid proviſion of ſymptoms, and eſpecially with a Syncope, and Phrenſie at once infeſting.

As to what appertains to its riſe; when the Plague firſt ariſes in any Region or Country, there is attributed a two-fold cauſe of it, *viz.* Primary or Metaphyſical, alſo Secondary or Natural, ſubordinate to that: The very Heathens did acknowledge this Diſeaſe, wherever it raged, ſent firſt of all from God, for the caſtigation of the wickedneſſes of men, and therefore for its extirpation, they equally made uſe of Prayers and Sacrifices as of Medicines. As to what belongs to the Natural cauſe, there are divers opinions. Some will, that the Peſtilence newly ariſen, be

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derived from the Heavens, and influences of the Stars only: on the contrary, others have affirmed it only to ariſe from the internal putrefaction of the humors of our Body: but theſe endeavour to deduce the cauſe of this ſickneſs too far off, and theſe more near than it ought. We will walk in the middle way, and what reaſon perſuades, and what very many Authors aſſert, we will place the chief and firſt ſeminary or ſeed plot of this Poyſon, in the Air; becauſe; it ſeems conſonant to Reaſon, that from the ſame Fountain, from which the common food of life is had, the beginnings of death, no leſs diffuſive, are to be ſought. There is the ſame neceſſity for our breathing in the Air, as of Fiſhes living in the Water; wherefore, as to Waters infected by Poyſon, the Murrain of Fiſhes dying in heaps is aſcribed; ſo Men dying of an Epidemical ſlaughter, without any manifeſt cauſe, nothing could kill, beſides the Infection of the commonly inſpired Air.

For the Air, which we neceſſarily draw in for the continuance of Life, conſiſts of an heap of Vapors and Fumes, which are perpetually breathed forth from the Earth; in which the exhalations of Salt and Sulphur, being mingled with the atomical vaporous little Bodies, conſtitute here as it were a thick cloud: the motions of theſe are ſwift and unquiet, they are of a manifold figure, and very much diverſe, wherefore ſome continually meet againſt others, and according to their various Configurations, they cohere with theſe, and are mutually combined one with another, and from thoſe they are driven, and fly away: from hence the reaſons of the Sympathy and Antipathy of every thing, depend. From the diverſe Agitations of theſe kind of Atoms, near the Superficies of the Earth, this or that Tract of the Air, enters into diverſe alterations, by which, Bodies, chiefly the living, are variouſly affected: becauſe the inteſtine motion, of the Particles of every Animal, depends very much upon the motion and temper of the Particles of the Air: foraſmuch as theſe perpetually exagitate thoſe, raiſe up thoſe lying aſleep, repair the loſs of thoſe flying away, ſhake the vital flame with their Nitroſity, and ſupply it with a Nitrous-Sulphureous Food, eventilate its being inkindled by continual turns of acceſs and receſs, and carry away the Soot and Fumes. So long as an apt contemperation happens in either, for motion and configuration, living Creatures injoy perfect health and life; but if the little Bodies ſwimming in the Air, be of that ſort of figure and power, that are plainly adverſe to the Spirits implanted in living Creatures, they looſe the mixtures of theſe, from the reſt, from whoſe Elements they are collected, and pervert their motions; hence the diſpoſitions of things are deſtroyed, life profligated, and, the ſame being ſcarce extinct, the Bodies undergo putrefaction; hence the tops of Trees, or of Corn, being ſtruck with a blaſt, ſuddenly grow dry or wither; hence, among Cattel, the Murrain often rages, which kills at once whole Flocks; by reaſon of this kind of cauſe, the Seeds of the Peſtilence firſt put themſelves forth, and attempt the ſlaughter of humane kind: for as invenomed Bodies in the bowels of the Earth or concreted on its ſuperficies, produce the Arſenical or Aconital mixtures, ſo theſe being even reſolved into vapour, and heaped together in the Air, create moſt pernitious Airs, from which Malignant and Peſtilential Diſeaſes ariſe; the infection, which after this manner Contaminates the Air, the moſt ingenious *Diemerbrochius*, a ſearcher of this Diſeaſe, contends, that is only ſent (as the wrath of angry *Apollo*) immediately from the angry right hand of God: but this were to multiply without any pretext of neceſſity (I will not ſay beings but) Miracles, and in every Plague to aſſert a Creation of new ſubſtance; when in the mean time, the virulent product of Minerals and Vegetables, which daily appear, and of as quite adverſe Nature to us, as the Plague, clearly teſtifie, that there lives hid in the Bowels of the Earth, plenty of invenomed matter, ſufficiently fitted for this buſineſs. For the little Bodies, which being rouled about with earthy matter, do conſtitute the Poyſonous mixtures in the boſom of the Earth, the ſame being reſolved into vapours, will be no leſs hurtful afterwards, and impreſs a peſtiferous blaſt to the Air, which they wander through: wherefore, by the leave of ſo Learned a Man, I ſhould ſay, that it ſeems not improbable, that the things which firſt of all affix the ſeed plot of the Peſtilence, to any tract of Air, be the Poyſonous *Effluvia* of fierce Salts and Sulphurs, and (by the Divine Will inſtigating) breathing forth from the bowels of the Earth; which ſometimes, being a long time before ſhut up, are leiſurely exhaled out of Dens and Caverns; ſometimes by reaſon of the motion of the Earth, or Earthquake, or a gaping of the Earth, they break forth in heaps; alſo, of the ſame kind, are thoſe which ordinarily are breathed forth from the filth of Souldiers in their naſty Camps; or from unburied Carcaſes; or from places, beſet with ſtanding and ſtinking Mud: but the little Bodies after this manner exhaled, obtain their wonderful height, properties, and abilities, by a long putrefaction, that therefore they are incongruous, and heterogeneous to all others whatſoever, and ſo being received into the Air, ferment it (as it were a maſs of Liquor) and pervert it from a wholſom and benign, into a moſt pernicious and wicked Nature.

Some Bodies more eaſily, others not ſo readily receive the malignant tincture of the Peſtilent Air. Thoſe who by reaſon of ill feeding are full of evil humors, and who by reaſon of fulneſs, have their Bloud ſtuffed with firable Sulphur, receive the Peſtilential Poyſon, by the leaſt blaſt of the invenomed Air, eſpecially if fear or ſadneſs happen, which convey inwardly,

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and lead to the Heart, as it were by a certain attraction, the moſt light darts of the Contagion. On the contrary, thoſe who have their Viſcera clean, and the Maſs of Blood well tempered, and are endued with a ſtrong and fearleſs mind, do not ſo eaſily receive this infection, and ſometimes exterminate itſoon, being received.

Thus much for the beginning and divulgation of the Peſtilence, according to its firſt Fountains, and from thence the ſtream of the infected Air being deduced; it remains for us to ſpeak concerning its propagation by contagion, foraſmuch as it is derived, as it were extraduced from ſome, and ſo to others.

We underſtaud by Contagion, that force or action, by which any Diſtemper reſiding in one Body, excites its like in another. But as this may happen, either immediately by contact, as when any one lying in the ſame Bed with another, taken with the Plague; or mediately, and at a diſtance, as when it happens that the infection is trans-ferred from one houſe to others remote, or alſo if the Plague come upon any one, after many days or months, perhaps years, handling a Garment, or Houſhold-ſtuff, brought from an infected Houſe; therefore that the Nature of the Contagion, and its diverſe modes may be plainly made known, we will firſt weigh what that is, which ſtreams from an infected Body. Secondly, How it bears it ſelf through the Medium of its paſſage. Thirdly, by what means it begets a Diſtemper like it ſelf, in another Body.

1. That from every Body, although of a more fixt Nature, *Effluvia* of Atoms conſtantly fly away, and run forth, which round about conſtitute as it were a Cloud or Halos, and as it were cloath it, like the down of a Peach, is ſo much received among the more ſound Philoſophers, that nothing can be more. But by how much the more any thing conſiſts of active Particles, by ſo much the more it ſends from it ſelf little Bodies of more remarkable virtue and Energy. Hence the *Effluvia* which fall from Ambers, are able to move other Bodies from their place: Emanations proceed from Sulphureous things, which fill the whole Neighbourhood with Odors. And ſo when the Peſtilential Venom, as hath been already ſaid, is from hence any where fixed, and though in the ſmalleſt Bulk, is of great efficacy and operation, there is a neceſſity that ſome emanations proceed from the Body imbued with it, which refer the Nature or diſpoſition of the ſame Poyſon and Malignity, and diffuſe them on every ſide according to its ſphear of activity. But when theſe little Bodies, which retain the contagion of the Peſtilence, as they ſtream from one Body, are not preſently received by another, we ſhall enquire how they carry themſelves, in reſpect of their paſſage through the Medium.

Where we ſhall preſently meet with a difference in thoſe, from many others, for that the *Effluvia*, which ordinarily evaporate, do not long retain the Nature or Diſpoſition of the Body, from which they flow, but either vaniſh into Air, or being impacted to other Bodies, are aſſimilated to them; but thoſe Particles, which fall from a Peſtilential Infection, are not eaſily ſupped up by the Air, or any other Body, ſo as they may be wholly deſtroyed; but among the various confuſions of Atoms, and the daſhings of other Bodies, they keep themſelves untouched. For this untamed Poyſon remains ſtill the ſame almoſt, and not to be overcome by others, and though it conſiſts of never ſo little heap of Atoms, will not preſently vaniſh; but with its Ferment, imbues the next little Bodies, and ſo acquires new forces, and gains ſtrength by going; from whence it lurks a long while in ſome Neſt, and after a long time, when it aſſaults a convenient Subject, puts forth it ſelf, and imparting the taint of its Poyſon to another, raiſes up again the Diſeaſe of the Peſtilence anew, which ſeemed before to be exploded, and though from the ſmalleſt Seminary, ſprinkles far and near its deadly poyſon.

For the Peſt brings forth ſuch moſt ſure ſigns of its Contagion, that ſome Authors contend, that for this reaſon it only continues among Mortals, and doth never ſpring up anew, but is only conſerved from its Neſt, and carried from thence, from one Region to another. Hiſtories relate, that the Seeds of this have lain aſleep for ſeveral years, in ſome Garment or Bed-cloaths, and that afterwards, they being ſtirred, it hath appeared, and hath ſtirred up anew the Diſeaſe of the Peſtilence, increaſing with a mighty ſlaughter of men. When by reaſon of the Tinder, or cheriſhing Neſt, the Plague is propagated after this manner, at a diſtance, the invenomed little Bodies, which remain in the infection, being moved, preſently leap out, and unfold its Poyſon every way, as it were by a certain irradiation: if that they ſtrike againſt any human body, preſently they lay hold on the Spirits, and are by their Vehicle conveyed inwardly, and then by an eaſie labour, they infect the Blood and Humors, whereſoever flowing in the Veſſels, with their Ferment, and quickly bring to them coagulations and putrefaction. And after this manner, through the moſt ſubtil *Effluvia*, is made as it were a certain tranſmigration of the peſtilential Diſeaſe, even as when a ſhoot being cut off from ſome Tree, and laid up for a time, and afterwards ingrafted to another Trunk, though from the ſmalleſt Bud, it is able to produce a Tree of the ſame kind and nature.

CHAP. XIII.

Of the Plague.

THus far we have diſcourſed of Poyſon in general, alſo of the Peſtilence, its beginning and propagation by Contagion: it now remains, that we explicate the Deſcription of the Plague, its Nature, according to its Accidents and Symptoms, moſt worthy of note; then ſome things ſhall be added which belong to its Cure.

The Plague may be deſcribed after this manner; That it is an Epidemical Diſeaſe, contagious, highly infeſtous to human kind; taking its beginning from an envenomed infection, received firſt by the Air, and then propagated by Contagion; which having hiddenly and largely ſet upon men, cauſes extinctions of the Spirits, coagulations of the Blood, Blaſtings, Mortifications or Deadneſſes of the ſolid parts, and with the appearances of Whelks, Buboes, or Carbuncles, as alſo with the horrid Proviſion of other Symptoms, brings the Sick in danger of Life.

Although the Plague be one kind of Diſeaſe, and its ſpecifical differences, or eſſential are not found, yet by reaſon of the divers kinds of Accidents, which come upon it, ſome diverſities and irregularities of it are obſerved, which ſomething vary the type of the Diſeaſe, though they change not the ſpecies. For firſt this Diſtemper ſometimes is more univerſal, that it rages every where through many Villages and Cities at once; but ſometimes it is circumſcribed in narrower bounds, and only threatens one Region or Tract of Land, Secondly, Sometimes the Plague comes ſimple, and unmixt with other Diſeaſes, wherefore privily, and as it were by ſurprize, almoſt without a Feaver, or vehemency of Symptoms, brings a ſecret killing of the Sick. Sometimes it is complicated, with a number of other Diſeaſes, that the buſineſs is carried with tumult and frequent skirmiſhing between Nature and Death. Thirdly, the degree of Malignity conſtitutes a great difference; for the Plague in ſome places and times is much more mild, that many of the Sick eſcape; ſometimes it is highly mortal, that moſt taken are killed, and that ſcarce one of a hundred recovers.

But becauſe this Diſeaſe hides its weapons, and coming on men unawares, kills them ſuddenly, therefore it ſhall be our work, that by ſome ſigns, as it were Watchmen planted, we may know the clandeſtine coming of this Enemy, although we are not able to foreſee it from afar. Very many ſigns happen, which foretel ſhortly a Plague about to come; to wit, if the Year keeps not its Temper, but has immoderate, and very unſeaſonable exceſſes, either of Heat or Cold, or Drineſs or Wet; if the Small Pox or Meaſles do every where rage; if Boils or Buboes accompany reigning Feavers. Beſides, Aſtrologers are wont, from the Aſpects of the Stars, or Appearances of Comets, to predict the approaching Plague, but this ought rather to be called a vain Conjecture, than a certain foreknowledge. From a preceding Famine, a moſt certain preſage may be taken, of a Plague to follow, as in the Adage, Μετὰ λιμῦ λοιμός; the Plague comes with the Famine. For the like Conſtitution of the Year, which for the moſt part, by reaſon of the Corn being blaſted, brings ſcarcity, is apt alſo to produce the Plague; alſo, an evil way of feeding which people in Dearths uſe, eating all unwholſom things, without choice, diſpoſes their bodies to the more eaſie receiving the Infection. Yea, alſo Earthquakes, freſh openings of Caverns and ſecret Vaults, by the gaping of the Ground, by reaſon of the Eruptions of malignant and empoyſoned Airs, often give beginning to the Peſtilence. For indeed, as there is need of great diligence to foreſee, as it were from a Watch-Tower, the approaching Plague, ſo there is no leſs need of care and diligence, to conſider, or take notice of the ſame, being freſh riſen, and the ſhooting of its firſt darts; for oftentimes, being too ſolicitous, we dread vulgar Feavers, if perchance they end in Death, for this Diſeaſe; and ſometimes being too ſecure, contemning the Peſtilence, by reaſon of its Symptoms, like to a common Feaver, we apprehend not our danger, till too late; wherefore, for the more full knowledge of this Diſeaſe, we will ſubjoyn its Signs and Symptoms both Common and Pathognomic, or peculiar, and briefly deſcribe their Cauſes, Means and manner of being done.

Beſides the Signs already delivered, which by a certain demonſtration *a priori*, or beforehand, bring a ſuſpition of the Plague about to come, there are others, the concourſe of which, plainly ſhew its preſence in the ſick Body; of theſe, ſome are common to the Plague, with a Putrid Feaver, ſome are more proper to this Diſtemper. For the impreſſion of the Peſtilence moſt often ſtirs up an efferveſcency of the Blood, and ſo has frequently a Feaver joyned with it, that among ſome, in the definition of the Plague, it hath the place of a kind of Feaver; wherefore, by reaſon of the ebullition of the Blood, and the hurt brought to the Viſcera, preſently there follows, a growing hot, a ſpontaneous wearineſs, thirſt, a burning of the Præcordia, often great vomitings,

ings, pains of the Heart, Torments of the Inteſtines, a Scurfineſs of the Tongue, or a Blackneſs, a pain of the Head, Watchings, Phrenſie, Palpitation of the Heart, Swooning, and ſudden loſs of Strength; though Feavers are moſt often beſet with theſe kind of Symptoms, yet if at the ſame time the Plague hath ſpred in the Neighbourhood, and a fear of it hath poſſeſſed the minds of men, hence a greater ſuſpition of this Evil is cauſed, eſpecially, becauſe, whilſt the Peſtilence reigns, other Diſeaſes in any one, leave their proper Nature, and change into it: wherefore, if there happens to the Diſtempers but now recited, a Communication of the ſame Sickneſs to many, and a frequency of Burials, that it becomes every where very deadly, and ſpreads largely even by contagion; and if beſides, Buboes, Carbuncles, Spots, or other marks of the Peſtiferous Infection appear, the buſineſs is put without doubt, and we may with no leſs faith denounce it the Peſtilence, than when we ſee an Houſe flaming, with fire breaking through the Rafters, we cry out Fire. But becauſe here is mention made of Buboes, Carbuncles and of other Symptoms (of which we have already ſpoken, where we treated of Putrid Feavers) it remains that we briefly touch the Cauſes of them, and the manner of their being made: They are theſe; A Carbuncle, a Bubo, Whelks, Inflammations, and malignant Puſtles.

Concerning theſe in common, we ſay, that they are all produced of the Blood and Nervous Juice, touched with the peſtiferous Poyſon, and coagulated in parts, in their Circuit, and diſtempered variouſly with Putrefaction; foraſmuch as the Spirits reſiding in either Liquor, eſpecially in the Blood, are no ſooner profligated, by the blaſt of this malignant Diſeaſe, but a coagulation is induced to the remaining Liquor, even as Milk growing ſowr, or when ſome acid Juice is powred to it, wherefore, portions of it being more grievouſly touched with the Poyſon, they ſoon curdle or grow into gobbets, and ſuffer corruption with blackneſs, like Blood out of the Veſſels; from whence, preſently they hinder the motion of the reſt of the Blood in the Veſſels, and in the Heart, and by means of its Ferment, more coagulate it; but whatſoever by congelation grows into curdled gobbets, unleſs it be preſently caſt out of doors, cauſes Death quickly, by reſtraining the Circulation of the Blood; and being thruſt forth outwardly, towards the ſuperficies of the Body, it is ſtopped in its motion, between the narrow Windings of the Veſſels; and being wholly deſtitute either of Spirit, or being ſtruck by a blaſting, produces its Deadneſs, black and blew Spots, and black or purple Marks; or by reaſon of the Salt and Sulphur being exalted by the Peſtilential Ferment, and affecting new things, grow together into tumors of a various kind.

A Carbuncle, or fiery Inflammation, is a fiery Tumor, with moſt ſharp and burning Puſtules round about it, and infeſting the ſick with an acute pain; which ariſing in various places ſeverally, will not be ripened, but creeping more abroad on the ſuperficies, burns the skin, and at length ſhakes off the Lobes or Gobbets of its Corruption, and leaves an hollow Ulcer, as if burnt by an Eſcharotick or burning Plaiſter.

The Generation of Plague-Sores, ſeem to be made after this manner, when poyſonous Infections do ſtrike into the Blood, in its own nature torrid, portions of it congealed, are fixed in the ſuperficies of the Body; and in that place, becauſe the motion of the Blood is a little hindred, a Tumor at firſt ſmall, is induced; which afterwards, by a malignant Ferment, unfolding it ſelf more largely, being leiſurely increaſed, creeps into the neighbouring part: A Suppuration follows not, becauſe the matter being extravaſated, and ſtagnating, is not concocted and digeſted by a gentle heat, but by reaſon of the Particles of the outragious Sulphur, together with the carried forth Salt, being heaped up in theſe Tumors, and becauſe of the ſtagnation, they being preſently looſened from the mixture, a burning is excited, as if a Cautery were affixed to the part: pieces and lobes of skins, eaten as it were from a covered Eſchar, fall off, becauſe the corroſive Venom, impacted in the Muſcles, gnaws not only to the ſuperficies, but thoſe that lie tranſverſe through the whole ſubſtance; wherefore, before all the fleſh is conſumed with the Membranes, in which the eaten Pieces were invalved, ſome piece, as it were cut off from the reſt, falls away. A Carbuncle, oftentimes but one, oftentimes more ariſe: ſometimes they are alone, ſometimes they are accompanied with a Bubo.

A peſtilent Bubo ſprings forth only in glandulous places, into whoſe ſubſtance goes, not only the Blood congealed by the Poyſon, and carried through the Arteries, but the nervous Juice heaped up there, and carried back into the Veins. Becauſe this Tumor happens from leſs torrid Juices, and in part more frigid, therefore it partakes of ſuppuration: for the matter being leiſurely heaped together, when (by reaſon of the ſtagnation) the vital Spirit being departed) it had loſt the form of Blood, it was by a long concoction converted into matter, from the particles of Salt and Sulphur exalted, and reſtrained in the Tumor. But that theſe Tumors only happen in the Glandula's, the reaſon is, not that by the deſtination of Nature, the Neſt or Tinder of the Diſeaſe is carried to theſe parts, but as the particles of the virulent infection, abound every where in the Blood, and nervous Juice, they are more readily gathered together, as in a common Family, and where the Blood being dilated to the extream parts of the Arteries, and is ſo not readily received, and carried back by the Veins, and alſo the alible Juice to be carried back from the Nerves, into the Veins, is depoſed; either of theſe, as it appears clearly, by late obſervations of

Anatomiſts, and by experience, are made or done about the Glandula's; wherefore, when in theſe parts, either humors, being ſtuffed with the peſtilent ſeeds of the Contagion, come together at once, as it were the Neſt of the malignity, becauſe of the virulency here depoſed from either, is blown up.

Whelks, fiery Inflammations, and purple Spots, in reſpect of the Venom, are of the ſame ſtuff as the Tumors but now deſcribed: but in theſe, the product of the virulency conſiſts in a leſſer ſubſtance, yet with greater danger, by reaſon of the ſeeds of the Poyſon being more diſperſed; more ſmall portions of the coagulated Blood being fixed in the skin, conſtitute theſe leſſer appearances, wherefore, out of theſe, ſome being increaſed, are ripened into little itching bliſters; others, by reaſon of a certain blaſting, or deadneſs of the corrupted Blood, grow into black and blew, and purple ſpots.

Although the Plague, by reaſon of its ſudden, ſecret, and very ſwift aſſault upon ſick people, hardly gives time or place for a Prognoſtick, and when this Diſeaſe, by reaſon of the occult manner of hurting, contains in it ſelf nothing that is not ſuſpected, yet there are ſome ſigns that appear in its courſe, by which we are wont to foretel either Life or Death. The buſineſs is then deſperate, if the Diſeaſe paſs preſently into an Epidemical Diſtemper, and makes violent Aſſaults; if that bleeding, or only a ſmall Sweat follows in the beginning of the Diſeaſe, if the Urine be thick and troubled, the Pulſe unequal and weak; if a Convulſion, or a Phrenſie preſently follow: if the Vomits or Stools are blewiſh, black, or highly ſtinking; if the Whelks at firſt contract a redneſs, afterwards a blewneſs; if the Carbuncles are many; if the Buboes at firſt ſwelling up, diſappear; if ſtrength be ſuddenly loſt, the Face horrid, or grows black and blew; if with a ſhivering of the outward parts, there be a heat of the Bowels; eſpecially if theſe, or many of them happen in a Body full of ill humors, or in an unwholſom ſeaſon. On the contrary, the ſick may be bid to be of good chear, if the condition of the Peſtilence be lighter, and leſs deadly; if the the Diſeaſe happens in a robuſt and healthful body, with a ſtrong mind; if Remedies may be timely had, before the Diſeaſe hath poſſeſſed the whole maſs of Blood. Alſo, if with a continuance of ſtrength, high and equal Pulſe, a ſuppuration of the Buboes, and a large profuſion of Matter, with the abſence of more horrid Symptoms, the courſe of the Diſeaſe is performed: In the mean time, although here we may hope all good, yet we are not to be ſecure, becauſe, ſometimes the ſnares of life are laid privily, with the laudable appearance of ſigns, and we ſuffer moſt grievouſly as from a reconciled Enemy, whoſe fierce threatnings we ſeemed to have ſhunned.

Concerning the curing of very many ſickneſſes, the buſineſs is chiefly committed to Nature, to whoſe neceſſity, Phyſick is the Midwife; and the Office and Science of a Phyſician chiefly is buſied in theſe, that occaſions of giving convenient Aids to this labouring be attended; but the Plague hath this peculiar, that its Cure is not at all to be left to Nature, but that it is to be endeavoured any way, by Remedies gathered from Art. Nor are we to be ſolicitous of a more opportune, or as it were a gentler time, but Medecines are moſt quickly to be prepared, and we muſt not ſtay for them ſome hours, no nor minutes: But becauſe, whilſt the Peſtilence reigns, there is no leſs need of care, that the Contagion may be driven far away, than that the Diſeaſe being impreſſed, may be cured; therefore a double task is incumbent on the Phyſician, to wit, that he looks to the prevention of this malignant Diſeaſe, as well as to the Cure. To preſcribe a method for both theſe, had been a work of too much tediouſneſs, and to have given you a Diſh a thouſand times dreſſed by Authors; wherefore, we will only touch lightly here ſome chief Indications, and haſte to other things.

Preventive Cautions either reſpect the Republick, and belong to the Magiſtrate, or private perſons, to whom it ſhould be taught, what is to be done by all men, when the Plague is feared.

The publick Care in the time of the Plague, conſiſts chiefly in theſe, That Divine Worſhip be truly obſerved, that all Neſts of Putrefaction be cut off, that Filths, Dunghils, and all ſtinking things may be removed out of the Streets, and all occaſion of the Contagion diligently avoided, and that an wholſom means of Living be conſtantly obſerved by the Citizens: For which end, the uſe of Fruits, and of other unwholſom things ſhould be interdicted; that poor people, who have not plenty or choice of food, ſhould be provided for at the publick Charge: If ſtill the Peſtilence begins to ſpread, the empoyſoned force of the Air ſhould be corrected as much as may be, which may be beſt done, by the frequent burning of Sulphureous things; the the infected ſhould be ſeparated from the ſound, and the dead Carcaſes and Houſhold-ſtuff ſhould be avoided; and laſtly, that able and fit Phyſitians, and Miniſters be provided for the uſe of the ſound, and neceſſities of the ſick.

The preventive means of a private perſon, is wont to be concluded in theſe three things; *viz.* Diet, Phyſick, and Chirurgery. Diet reſpects the ſix non-natural things, among which, of the greateſt moment are, the Air, and Paſſions of the mind; as to the reſt, *Hippocrates* his Precept may ſuffice, *viz.* Labour, Meat, Drink, Sleep, *Venus* ſhould be taken moderately. The Peſtilent Air ſhould be avoided, by going into ſome other place; , or corrected by the well burning

ing of Sulphureous things, or whilſt we breath it ſhould be cured by fumigations and ſweet ſmells, often carried near the noſtrils. As to the paſſions of the mind, fear and ſadneſs, whilſt the Peſtilence rageth, are as it were another Plague; for in theſe, the ſeeds of the envenomed Contagion, which are placed in the ſuperficies of the Body, as it were on the edge of a Whirlpool, are ſnatched inwardly, by a certain force, and carried to the Heart; wherefore 'tis a moſt excellent Antidote, to be of a chearful and confident Mind. I have known many, who (as *Helmont* was wont to ſay) by fortifying the Archeus, with Wine and Confidence, never uſed any other Poiſon-reſiſting Medecines, and remained without any hurt of the Contagion among the infected; and on the contrary, ſome ſtruck with fear, when they have dwelt far from all Contagion, have drank in the ſeeds of the Peſtilence, as if they were derived from the Stars.

Among the Chirurgical things to be adminiſtred for preſervation ſake, are wont to be commended, the opening of a Vein, Cauteries and Amulets. Where there is a fulneſs with a great ſwelling up of the Blood; or in thoſe who conſtantly, by long cuſtom are wont to be let Blood, it is convenient to open a Vein; for the leſs the Blood grows hot, and is circulated without tumult in the Veſſels, it will be ſo much the longer ere it be contaminated by the peſtiferous Diſeaſe. Iſſues made by Cauteries, are ſo much uſed, almoſt by the ſuffrage of all, for preſervation ſake againſt the Plague, that it is become the moſt common Receipt; for theſe by a common tranſmiſſion poure forth the aſſiduous coming of the ſuperfluous and excrementitious matter; and if that the infections of the Peſtilence be admitted inwardly, they are caſt forth of doors at theſe open ports.

Amulets hung about the Neck, or born on the Wriſts, are believed to have a wonderful force againſt the Peſtilence; of theſe, among ſome of the greateſt eſteem, are ſuch as are made out of Arſnick, Quickſilver, the Powder of Toads, and other Poyſons. That the ſame in this caſe may be profitable, beſides the Obſervations of Phyſicians, this reaſon may ſeem to perſuade ſomething. The *Effluvia*, or Atomical little Bodies, emerging now from theſe Bodies, now reſiding upon theſe, are before affirmed to fly about through the whole Region of the Air; theſe, as they are diverſly figured, ſome of them eaſily cohere with others, but if they ſtrike againſt ſome of another form, they oppoſe and overturn them: hence the particles of the peſtilent infection, which are adverſe to our ſpirits, excellently agree with thoſe little Bodies of Poyſon, placed near, and are readily fixed to them; wherefore the Amulets made of Poyſon, do this, *viz.* They receive the ſeeds of the Peſtilence meeting us, into themſelves, by reaſon of the likeneſs of parts; alſo, by alluring the ſame from our bodies, into their embraces, they in ſome meaſure, free the infected from the infection.

The Medicinal prevention hath a twofold ſcope: Firſt, That the aſſiduous coming of the excrementitious matter or humors be taken away by a gentle purging as often as there is need: Secondly, That by the daily taking the Poyſon-reſiſting Medecines, our Spirits and Body may be fortified againſt the Aſſault of the poyſon; By the former, the Food and Cheriſhers, of which encreaſe putrefaction brought in by the poyſon are drawn away; by the latter, the firſt enkindling of the peſtiferous infection, as it were, a deadly fire is inhibited. Alexipharmies or Medicines contrary to poyſons, ſeem to be helpful againſt the contagion of the Plague, for this twofold Reaſon; both becauſe the Maſs of Blood and Viſcera being filled with the particles of theſe, and alſo the Spirits before poſſeſſed with the ſame, they do not eaſily admit of the company of the impoyſoned infection; alſo, becauſe the Blood being incited by the gentle fury of theſe, is kept from coagulation.

Thus much for preſervation, it follows now, that we ſpeak of the Cure of the Plague. The Doctrine of which, is either general, and comprehends Remedies, which for this end, are taken from Diet, Chirurgery, and Medecine; or ſpecial, which delivers the uſe and Cautions to be exhibited about thoſe Remedies; and by what means we are to oppoſe the Symptoms variouſly ariſing.

Diet comprehends the uſe of the ſix Non-naturals, but the chief care, and medical Cautions, are to be given about Eating; the primary Indications of this, conſiſt not at one and the ſame time together, but ought to be ſupplied by turns, according to the nature of the thing, and the exigency of Nature. In reſpect of the malignity, and of the loſs of ſtrength, Aliments are to be deſired, which greatly cheriſh the Spirits, and bring a more plentiful Nouriſhment: in reſpect of the Feaveriſh Diſtemper, a more ſlender refrigerating Diet, and temperating the Blood, ſeems to be required: the Phyſician muſt regard either, but he may rather intend his Remedies againſt the Malignity, than the Feaver.

The Helps that belong to Chirurgery, are the opening a Vein, which ſeldom and very cautiouſly ought to be uſed in this Diſeaſe, becauſe the Blood being too much exhauſted, and the Veſſels falling down, Sweat is not ſo eaſily procured; inſtead of this, it is better to uſe Cupping, with Scarification; for this and Bliſtring are rightly applied for the drawing forth of the Venom; moreover, againſt Buboes, Inflammations, or malignant Ulcers produced by them, Cataplaſms, Fomentations, Plaiſters, Oyntments, and many other things, to be outwardly applied, are to be ſought for from Chirurgery, in which ſome Poyſons, as the Electric of Poyſon,

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are preſcribed by ſome to be admixed; wherefore, Preparations of Arſnick, to wit, the Oyl and Balſom of it, are commended by many, in this caſe too of moſt excellent Uſe and Efficacy.

Medecines for the Cure of the Plague, are either Evacuators, or Poyſon-reſiſters: The intention of the former is, that the ſerous Latex in the Blood, and the excrementitious Humors, which abound in the Viſcera, be thruſt forth of doors; and together with them, very many Particles of the envenomed Infection, every where diſperſed in the Body: But theſe are both Vomitories and Purgers, the uſe of which is more rare, and only in the beginning of the Diſeaſe, alſo Diaphoreticks or ſweating Medecines, which at ſometimes may be ſuffered according as there is ſtrength, are to be preſcribed in the Plague; for theſe more fully, and from the whole Body at once evacuate, yea, and by agitating the Blood, defend it from Congelation, and as they move from the Center, ſtill to the Circumference, they drive the empoyſoned Ferment, alſo the Corruptions of the Blood and Humors, far from the Heart, and ſo chaſe the Enemy without the Camp. But Vomits and Purges evacuate leſs univerſally, and by concentrating the malignant matter, oftentimes carry it inwardly, and fix it to the Bowels. But theſe Medecines, whether they operate by purging, or ſweating, ought to be of that kind, which have particles, rather agreeable to the empoyſoned infection, than to our Blood or Spirits; for ſuch a Medicine will paſs through the various windings of our body, with its whole forces and unmixt, and by reaſon of the ſimilitude of either, more certainly takes hold of the virulent Matter of the Diſeaſe, and carries it forth of doors with it ſelf, by the mutual adheſion of the parts, which way provoked Nature leads. Wherefore, Medecines, whether Catharticks, or Sudorificks, are commended before others, which are prepared out of Mercury, Antimony, Gold, Sulphur, Vitriol, Arſenick, and the like; which, when they cannot be ſubjugated by our heat, or maſtered, become the beſt Remedies againſt the poyſon of a Peſtilent Diſeaſe; for theſe do not only potently evacuate ſuperfluous things, but whenas they put forth very ſtrong and untameable particles, and explicate them every where in the Body, diſſipate the Ferments of the Poyſon growing here and there, and hinder them from maturation; and as theſe Remedies, being of themſelves not to be overcome by Nature, are neceſſitated to be carried outwardly through the open paſſages of the Body, they carry forth of doors with them, whatſoever extraneous or hoſtile thing is met with.

As to Poyſon-reſiſting Medecines, or Alexiterians, which are ſaid to reſiſt the Poyſon of this Diſeaſe, without any ſenſible evacuation, they are (for the moſt part) ſuch whoſe particles are not very much of kin to Nature, ſo as to go into Aliment; nor ſo diverſe, as to provoke to an excretion. The ſame being inwardly taken, and broken into the ſmalleſt pieces, inſpire the Blood, and Juices flowing together in the Veſſels, and Viſcera, with their little Bodies, as with a new Ferment, and by moving the ſame gently, and by keeping them in an equal mixture, defend them from Coagulation and Putrefaction; diſſipate the particles begun to be heaped up, one from another, by the ſame gentle agitation, and hinder them from maturity; and laſtly, by prepoſſeſſing the Blood and Spirits, defend them from the impreſſions of the peſtilent Mark. Among theſe, ſome more ſimple Remedies are commended, as Rue, Scordium, *&c.* But moſt of all by far are eſteemed, thoſe that are compounded; wherefore, Treacle, Mithridate, and Diaſcordium, ſome of which are compoſed of no leſs than fifty ſimples; that it is eſteemed a Crime in Medecines ſo compleat in all numbers, to omit one Plant, or one Dram of them in their Compoſitions; the reaſon perchance is, becauſe very many things being put together, may make a Maſs, whoſe diverſe kinds of particles being exalted, by long digeſtion, may ſtir up the greater Fermentation in our Blood and Humors.

Having after this manner ranked the Remedies, in which we ought to be inſtructed, for the curing of the Plague; now next we ſhould ſpeak of the Method of Cure, *viz.* What firſt, and then what next ſhould be done in order: but that Diſeaſe hath ſo precipitous a courſe, that there is neither place for deliberation, nor is there frequently any Phyſician to be gotten, for fear of the Contagion; wherefore, there is no need here of many preſcripts, or a long ſeries of Indications; this buſineſs is to be quickly performed, and may be comprehended in a few things. Therefore, when the Peſtilence reigning, any one is diſtempered with the Contagion of this Diſeaſe, the help of the Omnipotent God being requeſted by Prayers, preſently Remedies are to be flown to. If the Plague happens in a Body not throughly purged, and prone to Vomiting, preſently let a Vomit be taken, whoſe operation being finiſhed, immediately let a Sweat be provoked, by taking Diaphoreticks, and the ſame continued as ſtrength can bear it, and afterwards be often repeated. Beſides, let Alexipharmicks or Poyſon-reſiſters be uſed almoſt every moment, until by the eruption of Whelks, Inflammations, or Buboes, all the Venom be wholly driven forth of doors; but in the mean time, proper and reſpective Remedies are to be oppoſed to the moſt urging Symptoms; but eſpecially fit helps are to be ſought from Chirurgery, for the Cure of the Buboes, and Plague-Sores: the whole weight of this buſineſs leans on theſe two Intentions; that the peſtiferous Poyſon may be every way expelled from within, and then, that the Recourſe of what is driven forth, be with equal diligence prevented.

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Concerning the Plague, we cannot ſo readily write Examples, and Hiſtories of ſick perſons, with exact Diaries of the Symptoms; becauſe theſe kind of Sickneſſes came not every year, neither when they ſpread, is it lawful for every Phyſician that takes care of his own health, frequently to viſit the ſick, or to ſtay long with them, whereby he may denote all Accidents, and diligently conſider the reaſons of them; which Task however, the renowned *Diemerbrochius* did ſo firmly perſiſt in, that after him, others may lawfully be ſuperſeded from this Work: when ſome times paſt, in this City, *viz.* 1645. the Plague (though not great) had ſpred, Dr. *Henry Sayer*, a very Learned Phyſician, and happy in his Practice, many others refuſing this Province, boldly viſited all the ſick, poor, as well as rich, daily adminiſtred to them Phyſick, and handled with his own hands, their Buboes, and virulent Ulcers, and ſo cured very many ſick, by his ſedulous, though dangerous Labour. That he might fortifie himſelf againſt the Contagion, before he went into the infected Houſes, he was wont only to drink a large draught of Sack, and then his perambulation about the Borders of Death, and the very Jaws of the Grave being finiſhed, to repeat the ſame Antidote: After he had in this City, as if inviolable as to the Plague, a long while taken care of the Affairs of the Sick without any hurt, he was ſent for to *Wallingford*-Caſtle, where this Diſeaſe cruelly raged, as another *Æſcupulapius*, by the Governour of the Place: But there being ſo bold, as to lie in the ſame Bed, with a certain Captain (his intimate Companion) who was taken with the Plague, he quickly received the Contagion of the ſame Diſeaſe; nor were the Arts then profitable to the Maſter, which had been helpful to ſo many others, but there with great ſorrow of the Inhabitants, nor without great loſs to the Medical Science, he died of that Diſeaſe. As to others, diſtempered by the Peſtilence, he was wont to order this kind of method of healing, if he was ſent for before the Buboes or Whelks appeared outwardly, for the moſt part he gave a Vomit, the preſcriptions of which were the Infuſion of *Crocus Metallorum*, ſometimes with white, and ſometimes with *Roman Vitriol*: The Vomiting being ended, he commanded them preſently to be put into a Sweat by the taking of Diaphoreticks; and thence, ſome intervals being granted, for the recovery of ſtrength, the ſweating to be continued to the declination of the Diſeaſe: but if he were ſent for to the ſick, after the appearances of the Marks, the Vomiting being let alone, he inſiſted only upon Sudorificks.

Chap. XIV.

Of Peſtilential and Malignant Feavers in Specie, *and of others Epidemical.*

After having having unfolded the Nature of the Plague, by the order of our Tract, we ought to proceed to the Diſeaſes which ſeem to be neareſt like its Nature; which chiefly are Feavers, called Peſtilent and Malignant; for it is commonly noted, that Feavers ſometimes reign popularly, which for the vehemency of Symptoms, the great ſlaughter of the Sick, and the great force of Contagion, ſcarce give place to the Peſtilence; which however, becauſe they imitate the Type of putrid Feavers, and do not ſo certainly kill the ſick, as the Plague, or ſo certainly infect others, they deſerve the name not of the Plague, but by a more minute appellation of a Peſtilential Feaver: Beſides theſe, there are Feavers of another kind, the perniciouſneſs and contagion of which appear more remiſs, yet becauſe they are infeſtous, beyond the force of putrid Feavers, and ſeem to contain in themſelves in a manner, the τὸ θεῖον or Hand of God of *Hippocrates*, are yet by a more ſoft Appellation, called Malignant Feavers.

Thoſe Feavers differ both from the Peſt, and from one another according to the degree, and vehemency of Contagion and deadlineſs; as the Plague is a Diſeaſe highly contagious, and deadly to humane kind; 'tis the Peſtilent Feaver, which commonly ſpreads with a leſſer diffuſion of its infection, and frequency of Burials. When the infection is only ſuſpected, and the Criſis happens beyond the Event of vulgar Feavers, only not to be truſted, or leſs ſafe, it is eſteemed for a Malignant Feaver, They are yet more fully deſcribed thus;

When the Feaver commonly ſpreads abroad, which for the variety of Symptoms, puts on the likeneſs of the putrid Feaver ſo called, to wit, when there are preſent, Thirſt, Burning, Wearineſs, Anxiety, roughneſs of the Tongue, Watchings, Phrenſie, Vomiting, want of Appetite, Syncopy, Swooning, Heart-pains, and a concourſe of other moſt terrible Accidents; if there happen beſides, Spots either like to the little Flea-bites, or broad ones, like black and blew ſtrokes, and livid, we eſteem this Diſeaſe of an evil Nature. If beſides theſe, it is not cured after

after the wonted manner of Feavers, but that the ſtrength of the Sick is caſt down, without any manifeſt cauſe, and that Death comes often unlooked for, and unſuſpected, againſt the Prognoſtick of the Phyſician, there is yet a greater cauſe of ſuſpition of malignity: But if it kills very many of the ſick, and that thoſe who converſe with the ſick, contract the evil of the ſame Diſeaſe, that the ſame Diſeaſe ſpreads through all the Villages or Cities, it may be ſaid to be more than malignant, a peſtilential Feaver; which is yet fully proved, if it rages in very many ordinarily with a certain common ſymptom, as when a Squinancy, Dyſentery or deadly Sweat, ſuch as in times paſt ſpred in *England*, accompany theſe ſort of Feavers.

If that a Feaver ariſes, which diſtempers many living in the ſame Region together, almoſt after the ſame manner, which notwithſtanding obſerves the Laws of a common putrid Feaver in its courſe, and is cured almoſt after the ſame manner, this is not ſaid to be Peſtilent, but only a Malignant Feaver; unleſs that in ſome labouring with a remarkable Cacochimy, or fulneſs of ill humors, the appearances of Buboes, or of ſpots, ſometimes with a deadly Criſis, and a Contagion creeping upon others, betray ſome ſigns of Malignity.

If it be demanded, to which Claſs of the aforeſaid Feavers theſe ſort of Peſtilential and Malignant Feavers ought to be placed, we aſcribe them only to the rank of continual Feavers; we diſchage or acquit intermitting Feavers, becauſe by intervals they grant ſuch firm Truces to Nature, and then they regularly and exactly obſerve their periods, which does not conſiſt with an envenomed diſpoſition. Alſo we except Hectick Feavers from malignity, beauſe otherwiſe their mortality would not be ſo long delayed, but that partaking of poyſon, they would kill ſooner: among continual Feavers, although we affirm, that the ſimple ſynochal Feavers are not free, yet they are rarely touched with this evil; but moſt of all, the Feaver which ſhews the notes of Peſtility or Malignity, is of that ſort, which reſembles the figure of the putrid Feaver ſo called: for when in theſe Feavers, beſides the appearances of virulency, we perceive a continual growing hot of the Blood, which paſſes through the courſes or ſtadia of beginning, increaſe, ſtanding and declination, as in putrid Feavers, we deſervedly affirm here, the ſulphureous part of the Blood to be heated and enkindled, and by its burning to have brought in the Feaver; wherefore in theſe kind of Feavers two things are eſpecially to be noted, the growing hot of the Blood, and the malignity joyned with it, of which now this, now that is the greater: alſo, in both there is a great latitude, and very many degrees of its intenſion or heat, according to which the Feaver becomes more or leſs acute or malignant.

The growing hot of the Blood is performed after the ſame manner, as is already ſaid concerning Putrid Feavers, to wit, the ſulphureous part of the Blood growing hot above meaſure, as it were takes fire by its fervor; in the time of its burning, it accumulates a great quantity of aduſt matter, upon whoſe ſubaction and ſecluſion, depend the State and Criſis after the wonted manner of Feavers; but beſides theſe, the Blood being infected with a certain venomous taint, in the burning it begins by reaſon of the malignant ferment, to be coagulated into parts, and to putrifie: wherefore beſides the uſual Symptoms of the common Feaver, by reaſon of ſome congealed portions of the Blood, follow either deadly Diſtempers, Swooning, a Dejection of the Spirits, alſo appearances of Spots and Marks; beſides venomous *Effluvia*, which depart from the ſick, that are able to raiſe up the like Diſtemper in others, by the force of their Contagion; wherefore by reaſon of its perniciouſneſs and contagion, and their various degrees, it is called either a Peſtilent or Malignant Feaver.

Alſo whilſt the Blood growing hot, is infected with a venomous and malignant ferment, not only proper coagulations of its maſs, with a diſpoſition to putrefaction, are induced; but alſo the Nervous Liquor, eaſily contracts the taint of this, from whence it being made improportionate to the Brain and Regiment of the Animal Spirits, ſtirs up great irregularities in them: wherefore upon theſe ſort of Feavers, come not only ſpots and whelks, but moſt often a Delirium, Phrenſie, Sleepineſs, Tremblings of the Limbs, Cramps, and Convulſive Motions; I have often obſerved, that in ſome certain years, Malignant Feavers have increaſed, which have ſhewn their virulency, without the appearances of Marks, chiefly about the Nervous ſtock; becauſe in ſome, preſently after the beginning, has followed a ſleepineſs, with a mighty heavineſs of the Head, in others, ſtrong Watchings, a perturbation of Mind, with Trembling and Convulſive Motions, but in moſt, either none, or only an uncertain Criſis, and inſtead of it, a tranſlation of the Feaveriſh Matter to the Brain; beſides it is obſerved, that theſe Feavers creep upon others Contagion, and that very many are killed by them, that therefore they do deſerve to be called Malignant.

But theſe kind of Feavers are ſometimes firſt begun from a venomous infection, and the Blood being touched with the Particles of the Venom, conceives of it ſelf an Effervеſcency, and is enkindled; as when from a Contagion or Malignant Air being inſpired, any one hath fallen into a Malignant Feaver, without any evident cauſe or prediſpoſition: But ſometimes the Feaveriſh Diſtemper is induced from a proper Cauſe, and then the Seeds of the Malignity, either lying hid within the Body, exert themſelves in the effervent Blood, or they come from another place by the contaminated Air, as it were the Food of the Flame before enkindled; for it appears by frequent

frequent obſervation in the time in which an Epidemical Feaver ſpreads, that others being any way ariſen, turn into it.

Malignant Feavers, as alſo Peſtilential, for the moſt part are popular, and invade many at once; but ſometimes they are private, and not ordinary, ſo that perhaps only one or two are taken in the whole Region; in ſuch a caſe it is to be ſuſpected that they come not from a malignant Air, or Epidemical cauſe, but from a morbous proviſion of the Body; for I have often obſerved that when in the Spring or Autumn, a Feaver ſufficiently common, hath ſpred in ſome City or Town, of which very many have died, perhaps ſome one on whom an evil prediſpoſition and a more ſtrong evident cauſe, hath brought the Feaver, hath lain by it, with more horrid Symptoms, and great notes of malignity: in which caſe that malignity is not to be called common to the Feaver, but not ordinary and accidental only.

Although the greateſt reaſon of the difference, by which theſe kind of Feavers are diſtinguiſhed from one another, and from other Feavers, conſiſts in their deadlineſs and contagion; yet ſometimes they are noted with a certain peculiar Symptom, from which they take for that time, both the note of malignity, and the appellation of the name: hence in ſome years an Epidemical Feaver reigns, which induces to moſt of the Sick a Squinancy, another time an Inflammation of the Lungs, a Pleuriſie, Dyſentery, or ſome other Diſtemper, and that oftentimes moſt dangerous, and contagious; ſo the ſeeds of Diſeaſes, not only derived from the Parents by traduction, excite their fruits as it were by a certain deſignation, in the ſame part or member; but alſo thoſe received from an infection commonly ſpreading, produce in all, a diſtemper of the ſame mode and figure; which yet I think to happen, not becauſe the ſeeds of the venomous Infection, reſpect either this or that Region of the Body, with a certain peculiar Virtue; but theſe ſo affect the Maſs of Blood, by a like manner in all, that there is a neceſſity, for the ſake of waſhing away this ſtain, that a Criſis be attempted after the ſame manner in all. For when, without malignity, the Bloud, by coagulation, or perhaps other Cauſes, is apt to be extravaſated, the uſual places, in which portions of the ſame being extravaſated, are wont to be fixed, are the Throat, Pleura, Lungs, and Inteſtines; wherefore, 'tis no wonder, when from a malignant cauſe, the congelation of the Bloud, and for that reaſon an extravaſation is induced, if the Diſeaſe is neſted in the accuſtomed cheriſhing place of Nature.

Concerning the Cauſes of theſe kind of Feavers, there is not much buſineſs; they are for the moſt part deduced, in reſpect of the malignity, from the vicious conſtitution of the Air; in reſpect of the Feaveriſh heat, from the morbous proviſion of the Body; either of theſe are eaſily made clear, by what hath been already ſaid concerning a putrid Feaver, and the Cauſes of the Peſtilence: If the malignity be ſtronger than the Feaver, and hath induced it, the impreſſion of it is to be imputed to the inſpired Air, or to a contagion received from others, if the Feaver be firſt, its inkindling is aſcribed to tranſpiration being hindred, to a Surfeit, or to ſome other of the evident Cauſes above enumerated.

As to the Signs, beſides Contagion and Deſtruction, theſe ſhew the malignity of the Feaver, a ſudden loſs of ſtrength, a weak and unequal Pulſe, and evil affection of the Brain and Nervous parts, being ſuddenly induced, cruel Vomitings, Blackneſs of the Tongue, a ſuffuſion of Darkneſs through the whole Body, but chiefly the appearance of Spots, Buboes, and of other Marks.

For the Cure of Feavers, both Peſtilential and Malignant, there is greater need of Judgment and Circumſpection, than in any others whatſoever: For when there are two primary Indications, to wit, the Malignity, and the Feaveriſh Intemperance, and when one can ſcarcely provide for the one, without detriment to the other, it is not eaſily to be diſcerned, which ſhould firſt be helped, or ſooneſt regarded. In reſpect of the Feaver, Purging, opening a Vein, and cooling things do chiefly help; but whilſt theſe are performed, the Malignity, for the moſt part is increaſed, and being neglected, ſpreads abroad more largely its Poiſon; againſt the Malignity, Poyſon-reſiſting Cordials, and Diaphoreticks are required, but theſe extreamly heighten the Feaver, they more ſhake the Bloud and Spirits before inkindled, as it were with the blaſt of Bellows, and force all as it were into a Flame; wherefore, here is great need of Skill, that theſe things be rightly ordered in themſelves, and where there is moſt of danger appearing, thence the curative intentions are to be more immediately deſigned; but ſo, as whilſt one is conſulted about, the other be not neglected. But in theſe Caſes, beſides the private Judgment of every Phyſitian, experience may ſupply the chief means of healing; for whenas theſe Feavers firſt ſpread, every one almoſt tries ſeveral Remedies, and by the ſucceſs of them collated together, it may be eaſily reckoned, what kind of Method is to be relied on, till at laſt, by a frequent trial, or the footſteps of thoſe paſſing before, there is made as it were a high and broad Road, for the curing of theſe ſorts of Diſtempers, bounded both with various obſervations and warnings.

Beſides theſe ſort of Feavers, which ſpread on many at once, and by reaſon of the Contagion, Deadlineſs, and conſpicuous Notes of Virulency, deſerve to be called Peſtilent or Malignant; there are ſome others, Epidemical or Popular, which almoſt every Year, either in the Spring or Autumn rage in ſome Countries; of which the Inhabitants for the moſt part of them are wont to be ſick, and not few, eſpecially of the Elder, to die: In which notwithſtanding, no ſigns of Peſtilence or Malignity appear, neither does the Diſeaſe ſeem to ſpread, from one and ſo to another, ſo much by contagion, as to lay hold on many, by reaſon of a prediſpoſition, impreſſed almoſt on all. But theſe kind of Diſtempers depend chiefly upon the foregoing conſtitution of the Year: for if the ſeaſon going before was very intemperate, by reaſon of exceſs of cold or heat, of drineſs or humidity, and ſo had continued for a long time, it changes our Blood very much from its due temperature, whereby it is apt afterwards to conceive Feaveriſh Effervеſcencies; and from hence a Feaver, now of this Type or Figure, now of that is produced; which preſently becomes Epidemical, becauſe it draws its beginning from a common cauſe, wherewith the bodies of all are in a manner affected: But ſuch Feavers, foraſmuch as they depend upon the Blood having gotten a diſpoſition, now ſharp, now auſtere, or of ſome other kind, by reaſon of the temper of the Year, for the moſt part are of the rank of intermitting Feavers; yet by a proper proviſion of Symptoms, they are wont to be noted according to the peculiar conſtitution of every Year. Theſe are not able to be comprehended under a certain common Rule, or formal Reaſon, which may quadrat to the Nature of each of theſe; becauſe they vary every year according to their ſeveral Accidents. However, we will give you the deſcriptions of theſe kind of Feavers, ſpreading of late years in this Region, had at that time, for ſome ſpecimen of the reſt, and add it for a concluſion at the end of this Tract.

There yet remains to be aſcribed to the rank of Malignant Feavers, ſome other private Feavers, and participating of no contagion; of which ſort chiefly are thoſe which are wont to happen to Child-bearing Women, by reaſon of difficult and hard Labour, or by reaſon of the ſtoppage of their Courſes. Indeed it ſufficiently appears by common obſervation, that theſe are very dangerous, and often mortal: for if by the parts of the Womb being hurt, or by Cold being admitted, or perhaps by any other cauſe, the Courſes are ſtopped, and the Humor which ought to be thruſt forth, ſhall be confuſed with the Maſs of Blood, it moſt wickedly infects it, as it were with a certain venomous mixture; that by that means, preſently a Feaver is excited, which with an evil proviſion of Symptoms, is very much beſet, *viz.* with heat and cruel Thirſt, Vomiting, pain of the Heart, and Watchings, and for the moſt part obtains, either no Criſis, or a very difficult one; becauſe, unleſs the wonted way of the flux of the Courſes, may be at length reſtored, it is wont, after the heat of the Blood hath been continued for ſome days, to communicate the evil to the Brain and Nervous Stock; from whence, by and by, a Delirium, Phrenſie, Convulſions, and other moſt wicked Diſtempers, are moſt often induced, which do not ſeldom end in Death: but theſe ſort of Feavers deſerve a peculiar conſideration, which we have more fully determined to ſhew hereafter in a particular Diſcourſe concerning this buſineſs; in the mean time, we will undertake to propoſe ſome Inſtances or Examples of the Feavers, but now delivered, *viz.* of the Peſtilent, and Malignant.

The Peſtilent Feaver, of late years, hath more rarely ſpred in theſe Regions, than the Plague it ſelf: of the only one of this kind, which fell under our obſervation, I will give you a brief Deſcription. In the Year 1643. when in the coming on of the Spring, the Earl of *Eſſex* beſieged *Reading*, being held for the King, in both Armies there began a Diſeaſe to ariſe very Epidemical; however, they perſiſting in that work, till the beſieged were forced to ſurrender, this Diſeaſe grew ſo grievous, that in a ſhort time after, either ſide left off, and from that time, for many Months, fought not with the Enemy, but with the Diſeaſe; as if there had not been leiſure to turn aſide to another kind of Death, this deadly Diſeaſe increaſing, they being already overthrown by Fate, and as it were falling down before this one Death. *Eſſex*'s Camp moving to the *Thames*, pitched in the places adjacent, where he ſhortly loſt a great part of his men; but the King returned to *Oxford*, where at firſt, the Souldiers being diſpoſed in the open Fields, then afterwards among the Towns and Villages, ſuffered not much leſs; For his Foot (which it chiefly invaded) being pack'd together in cloſe Houſes, when they had filled all things with filthineſs, and unwholſom naſtineſs, and ſtinking Odors (that the very Air ſeemed to be infected) they fell ſick by Troops, and as it were by Squadrons. At length the Feaver, now more than a Camp-Feaver, invaded the unarmed and peaceable Troops, to wit, the Entertainers of the Souldiers, and generally all others, yet at firſt (the Diſeaſe being yet but lightly inflicted) though befet with an heavy and long languiſhment, however many eſcaped. About the Summer Solſtice, this Feaver began alſo to increaſe with worſe proviſion of Symptoms, and to lay hold on the Husbandmen, and others inhabiting the Country. Then afterwards ſpred through our City, and all the Country round, for at leaſt ten Miles about. In the mean time, they who dwelt far from us, in other Counties, remained free from hurt, being as it were without the ſphere of the Contagion. But here this Diſeaſe became ſo Epidemical, that a great part of the people was killed by it; and aſſoon as it had entred an houſe, it run through the ſame,

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that there was ſcarce one left well to adminiſter to the Sick; Strangers, or ſuch as were ſent for to help the ſick, were preſently taken with the Diſeaſe; that at length, for fear of the Contagion, thoſe who were ſick of this Feaver, were avoided by thoſe who were well, almoſt as much, as if they had been ſick of the Plague.

Nor indeed, did there a leſs Mortality, or ſlaughter of men accompany this Diſeaſe; becauſe Cachectick and Phthiſical old men, or otherwiſe unhealthful, were killed by it; alſo not few of Children, young men, and thoſe of a more mature and robuſt age. I remember in ſom[a] Villages, that almoſt all the old men died this year, that there were any left who were able to defend the Manners and Priviledges of the Pariſh, by the more anciently received Tradi[e]tions.

When this Feaver firſt began, it was ſomething like the Figure of a putrid Synochus; but it was harder to be cured: and when it ſeemed to be helped by a Sweat or Looſneſs, preſently it was wont to be renewed again; but for the moſt part, after the deflagration of the Blood, continued for ſix or ſeven days, this remitting, and inſtead of a Criſis, the aduſt matter being tranſlated to the Brain, the Sick for a long time keeping their Beds with raging ſometimes, but more often with a ſtupefaction, with great Weakneſs, and ſometimes with Convulſive Motions, ſcarcely eſcaped at laſt. About the middle of the Summer, beſides the Contagion and frequent Burials, this Diſeaſe betrayed its Malignity, and Peſtilential force in open Signs, *viz.* by the eruption of Whelks and Spots; becauſe about this time in many there appeared without any great burning of the Feaver, an unequal, weak, and very much diſordered Pulſe; alſo without a manifeſt expence of Spirits, their ſtrength preſently became languiſhing, and very much dejected: In others, Sick after the ſame manner, appeared little Bliſters or Meaſles, now ſmall and red, now broad and livid: in many, Buboes (as in the Plague) about the Glandula's: of theſe ſome died ſilently and unforeſeen, without any great ſtrugling of the Spirits, or Feaveriſh Burning excited in the Blood: in the mean time others, by and by becoming furibundous, whilſt they lived, ſuffered moſt horrid Diſtractions of the Animal Spirits. Thoſe about to eſcape from this Diſeaſe, without any laudable Criſis (unleſs they were the ſooner freed by a Sweat provoked by Art) the Brain, and nervous ſtock becoming diſtempered, at length, with a benummedneſs of the Senſes, Tremblings, Vertigo, Debility of Members, and Convulſive Motions, did not grow well but of a long time after. During the Dog-days, this Diſeaſe being ſtill infeſtous, began to be handled not as a Feaver, but as a leſſer Plague, and to be overcome only by Poyſon-reſiſting Remedies; letting of Blood, was believed to be fatal to this: Vomits and Purges, ſometimes though not often, were made uſe of, but the chiefeſt means of Cure, were accounted to be procured by Alexiteriums, and timely Sweat. For this end, beſides the Preſcripts of Phyſicians, to be had at the Apothecaries, ſome Empirical Remedies deſerved no ſmall praiſe; then firſt of all, the Pouder of the Counteſs of *Kent*, began to be of great eſteem in this Country; alſo of no leſs note was another Pouder, of the colour of Aſhes, which a certain Courtier ſtaying by chance in this City, gave to many with good ſucceſs; and to others approving of the uſe of it, he ſold it at a great price; the ſick were wont having taken half a dram of this, in any Liquor, to fall into a moſt plentiful Sweat, and ſo to be freed from the virulency of the Diſeaſe; That Diaphoretick (whoſe Preparation I afterwards learnt from the Cozen German of the Author) was only the Pouder of Toads, purged throughly with Salt, and then waſhed in the beſt Wine, and lightly Calcined in an earthen Pot. The Autumn coming on; this Diſeaſe by degrees remitted its wonted fierceneſs, that fewer grew ſick of it, and of them many grew well; till the approach of the Winter, when this Feaver almoſt wholly vaniſhed, and Health was rendred to this City, and the Country round about fully and wholly.

Thus you have ſeen the Beginning, Progreſs, and End of this Feaver, at firſt only a Camp-Feaver, but at length became Peſtilential and Epidemical. That at firſt the Diſeaſe began in the Souldiers Camp, may ſeem to be imputed not only to their Naſtineſs and ſtinking Smells, but in ſome ſort to a common Vice of the Air, for as theſe Feavers come not every year, their Original may be aſcribed, partly to the peculiar Conſtitution of the Year; becauſe by that means a more light intemperance of the Air being contracted, though it did not affect the more healthful Inhabitants; yet in the Army, where evident Cauſes, *viz.* Errors in the ſix non-naturals, very much happen to the general procatartick Cauſe, there is a neceſſity for theſe kind of Sicknelſes eaſily to be excited. For the conſtitution of this year, was in the Spring very moiſt, and ſlabbery, almoſt with continual ſhours, to which a more hot Summer ſucceeding, and the infection of the Feaveriſh Contagion here firſt increaſing, ſtill grew worſe, and diſpoſed all Bodies the more for the receiving it; wherefore, that this Diſeaſe was almoſt proper to this Region, and at this time Epidemical, the ſeed of it ought to be aſcribed to its firſt riſing from the Army, being quartered round about. But foraſmuch as it afterwards being made Peſtilential, and very Epidemical, it infected moſt of the People living here, and killed not a few, the reaſon was, the evil affection of the Air; which becauſe of the intemperance of the year, being unwholſom, beſides by the continual breathing forth of ſtinking Vapors from the Souldiers Camp, and the quarters of the Sick, it became at laſt ſo vicious, that the infection of the Feaver, being diſperſed in it,

was greatly exalted, and aroſe almoſt to the virulency of the Plague. *Diemerbrochius* relates from the like Camp-Feaver, ariſing in the Summer at *Spires*, afterwards another Malignant and Peſtilential, and then the Plague it ſelf to have accrued. Alſo, it was a ſign that this Feaver of ours, became at laſt equal to the Plague it ſelf, beſides the great force of the Contagion, and the frequency of Burials, moſt wicked Diſtempers of the Blood, and nervous Liquor, being brought preſently upon all, by it: becauſe, ſtrength being ſuddenly overthrown, the weak intermitting Pulſe, the creeping forth of Meaſly Bliſters, the eruption of Buboes, argued the Coagulation, and corruptive diſpoſition of the Blood: beſides, the Delirium, Madneſs, Phrenſie, Stupefaction, Sleepineſs, Vertigo, Tremblings, Convulſive Motions, and divers other Diſtempers of the Head, ſhewed the great hurt of the Brain, and nervous Stock.

That the Figure or Idea of this malignant Feaver, may be painted to the Life, very many Obſervations or Hiſtories of ſick people are eaſily to be had; of the many Examples of this Diſeaſe, I ſhall only mention a few, which hapned ſome years ſince in the Houſe of a venerable man, and as with a mournful ſlaughter, ſo not without ſome admiration.

About the Winter Solſtice, in the Year 1653. a Youth of about ſeven years old, without any manifeſt cauſe, found himſelf ill, being troubled with a pain in his Head, Sleepineſs, and mighty Stupefaction; with it he had a Feaver, though not ſtrong, with an ordinary burning, which grew more grievous, only by wandring fits, ſometimes once, ſometimes twice in twenty four hours ſpace: preſently from the beginning, he ſlept almoſt continually; alſo he was wont in his ſleep to cry out, to talk idly, to leap often out of his Bed; being awakened, and ſometimes of his own accord awaking, he preſently came to himſelf, and conſtantly called for drink; his Urine was red, and full of Contents, his Pulſe equal, and ſtrong enough; in his Wriſts appeared light contractures of the Tendons, and in his Neck, and other parts of his Body, ſome red Spots like Flea-bites. At the firſt, was ordered a light Purgation, and a frequent taking down of the Belly, by the uſe of Clyſters; he daily took Cordial Juleps, with Poyſon-reſiſters; Veſicatories or bliſtering Plaiſters were applied to his Neck, and other Plaiſters to the Soles of his feet: on the ſixth day, a little Blood ſtreamed from his Noſtrils; on the ſeventh, without any manifeſt through Criſis, the Feaver very much abated, the heat ſo gentle as to be perceived only by the Touch; alſo the Urine pale, thin, and without any ſediment, yet he was much more grievouſly troubled with ſleepineſs, and a ſtupefaction of the Head, ſo that his Urine, and the Excrements of his Belly came away involuntarily; however, being called upon, he knew the ſtanders by, and anſwered to their Queſtions: Theſe Diſtempers, notwithſtanding the Remedies, every day grew worſe: About the fourteenth day, the ſick Youth became ſo ſtupid, as neither to be able to underſtand, nor to ſpeak, yet he ſwallowed ſtill what was put into his Mouth, though unknowingly, and his Pulſe was laudable enough: About this time, he fell into a Flux, excited of it ſelf by Nature for four days, which at laſt ceaſing, a whitiſh Cruſt or Scurf, and as it were Chalky, began to ſpread over the whole Cavity of his Mouth and Throat, which being often in a day wiped away, new preſently broke forth: when he had thus for four days more been ſick, he became better in his Intellect and Senſe, ſo that he was able to know his Parents and Friends, to take notice of their words, and to do ſomething as he was bid; but as his ſenſitive Faculty began to be reſtored, ſo he began to grow worſe as to his Speech and the Organs of ſwallowing; without doubt the matter being fallen from the Brain, into the beginnings of the Nerves, a Palſie in the Tongue and Throat had ſucceeded to the heavineſs and ſtupefaction: which Diſtemper in a ſhort time ſo increaſed, that afterwards the ſick perſon could not ſwallow at all, but that what he took in at the Mouth, preſently flowed back again, neither could any thing go down into the Stomach; when beſides the cruelty of the Diſeaſe, there was danger leſt he ſhould be killed by Famine, an Inſtrument was prepared of a Pin of Chalk, put into a little pliant Wand, and on the top of it a little tuft of Silk made fit; and this being thruſt down his Throat, opened the cloſing for a time, whereby the Food taken in, was ſuffered to paſs; after the uſe of this for a day or two, he was able to ſwallow again, and afterwards to take his Food well enough; and within a few days, he began to ſpeak, to diſcern any thing, and becoming wonderful hungry, to ask for, all day long, all ſorts of Food, and greedily to devour whatever was brought to him. In the mean time, by reaſon of his long Sickneſs, and the nervous parts being grievouſly hurt, he was grown ſo lean, that the Bones ſcarce ſticking to the Skin, he repreſented exactly a living Skeleton. But afterwards, by the ſedulous, indefatigable, and prudent Care of the Mother about his Diet, he recovered perfect Health, and is yet living, and well.

When this Child had hardly arrived to the height of his Sickneſs, his Brother, elder about two years, on the Ides of *January*, was taken almoſt after the ſame manner: At firſt he was troubled with a Torpor and heavineſs of the Head, then growing Feaveriſh, with a ſleepineſs and ſtupidity; he began to talk idly in his Sleep, then being awake hardly to come to himſelf: after four or five days, theſe Symptoms grew more grievous; he was able to underſtand little, nor ſcarce to ſpeak articulately, and not without ſtammering. His Urine was thick, cloudy, without Hypoſtaſis, or ſetling of the Contents: There appeared, as in his Brother, red ſpots, ſmall,

ſmall, like Flea-Bites: his Excrements both of his Belly and Bladder, came away involuntarily: but his Pulſe was yet ſtrong and equal; his Hypochondria were ſtretched out, and inflated with a tumor of the Abdomen; about the eighth day, he had a ſmall ſtream of Blood: on the eleventh day of his Sickneſs, he fell into a Diarrhæa, by which, in the ſpace of five hours, he caſt forth ſeven times, bilous, thin, and highly ſtinking ſtuff, from whence there was ſome hope of his amendment; but the next day after, the flux of his Belly ceaſing, pains and torments cruelly infeſted his Belly, that crying out and moaning night and day, he ſent forth moſt heavy complaints; his Hypochondria and Abdomen were tumid like a Tympany, and mightily diſtented; when he could not receive any thing of eaſe, from no Remedies, the moſt exquiſite Skill of many Phyſicians being tried, on the fourteenth day he died Convulſive, in theſe Torments.

A little after his Death, *viz.* on the thirteenth of *February*, his Brother, elder than him, about eleven years old, a Youth of great hopes, began to be Feaveriſh; and as the others, with a torpor and heavineſs of his Head, though leſs ſtrongly affected; but the heat in the Blood was greater, which was of a more hot temperament, and greater perturbation appeared, that for the firſt ſix days, beſides heat and thirſt, he was troubled with a continual endeavour of excretion, now by Sweat, now by Stool. His Urine was red and troubled; ſome red Spots, as in the reſt broke forth; on the ſeventh day he had a bleeding about five Ounces, which ceaſing, a great benummedneſs ſucceeded, that for all that day and the night following, he could ſcarce lift up his Eyes: On the eighth day, a moſt plentiful bleeding followed again at the Noſe, that there was danger, leſt he ſhould have loſt his Life, together with his Blood; the Blood ſprang ſo copiouſly from his left Noſtril, that being received in a Baſon, it made little Bladders or Bubbles by its fall: when he had loſt above two pound of Blood, and being taken with a cold Sweat, began to loſe his ſtrength, Remedies were at length adminiſtred, and the Flux was yet hardly ſtopped. The Hæmorrhage being ſtayed, the Youth ſlept ſoundly, and all that day became ſleepy; yet often awaking, he remained well in his Senſes, and was quick in ſenſe, and underſtanding; and being asked of his health, he ſaid he was pretty well; his Urine, which which was before red and troubled, then appeared pale, thin, and with a laudable Hypoſtaſis, that the Sick ſeemed (eſpecially becauſe he wanted thirſt, or immoderate heat) to be perfectly cured and freed from the Feaver: on the following Morning, being the ninth day of the Feaver, he remained yet torpid, but being raiſed up, he living chearfully and intemperance, ſeemed to be in a condition of growing well, but that he began a little to faulter in his Speech: in the Evening, when it was leaſt ſuſpected, the Feaver being again enkindled, on a ſudden he fell into a Lethargy, that he was ſcarce able to be awakened from ſleep, and being pulled, ſcarce to know any body, or to ſpeak plainly; although ſo great a loſs of Blood had gone before, the Pulſe was yet quick, high, and vehement; alſo the Urine red; after deriving and withdrawing Remedies had been uſed all that night, this Youth ſeemed to be in a little better condition, ſo that in the morning, he continued a long time from Sleep, but began to rowl about his Eyes hither and thither, and to ſet himſelf up a little; yet without ſpeaking, or knowledge of thoſe that were about him: before noon, his Eyes being ſhut again, he wholly loſt the uſe of every Animal Faculty: he lay for three days as it it were Apoplectick, with an high and vehement Pulſe, with a palpitation of the Heart, and a difficult and painful breathing; his Pulſe at length growing leſſer by degrees, he died the thirteenth day of the Feaver.

On the fifteenth of *February*, his Siſter ſomewhat leſſer than he was, began to complain of a pain and torment in her Belly, a trembling in her hands, and a painful tenſion or ſtretching out of the Muſcles of her Neck, with a feaveriſh intemperance and thirſt: on the laſt day of *February*, ſhe growing plainly into a Feaver, could not keep out of her Bed: moreover, ſhe was troubled with a wandring heat, now in her Face, now about her lower parts; alſo ſhe became heavy and ſomnolent, and awaking from ſleep, could not preſently come to her ſelf. On the firſt of *March* ſhe was lightly Purged and with eaſe, with an expreſſion of Rhubarb: her Urine was thick and red; alſo petechial red ſpots (as in the reſt) were conſpicuous: we gave her after that, for four days, at ſeveral times, to wit, after the interval of every ſix hours ſpace, ten drops of the Spirit of Harts-Horn, in a ſpoonful of Cordial Julep; the aforeſaid Symptoms afterwards leiſurely remitted, and this ſick Child, though ſlowly, recovered health without any manifeſt through Criſis.

About the ſame time her little Brother, younger than any of theſe, fell ſick almoſt after the like manner; who, yet, a Looſneſs ariſing naturally of it ſelf, for many days, voyding Cholerick and greeniſh ſtuff, was eaſily cured. Alſo in the ſame Family, many other Domeſticks, and ſome Strangers coming to help them, the evil being propagated by Contagion, fell ſick of the ſame Diſeaſe: who notwithſtanding, at length became well, though with difficulty, and ſlowly, without any regular Criſis being made.

That this Feaver was malignant, plainly appears by the Contagion, Mortality, and Appearances of Spots, and many other ſigns; though that infecting Contagion, whereby it ſpred from one to another, ſhewed it ſelf ſlow, and of leſſer efficacy; becauſe, between the Sickneſſes of each

each of them, many days, and oftentimes weeks hapned to be, that the Infection of this though acute Diſeaſe, and the diſſemination on others, was ſcarcely finiſhed in four months ſpace, in the ſame Houſe. The Feaver about the firſt beginning ſeemed gentle and mild, not very terrible as to burning; but the matter being heaped together, from the deflagration of the Blood, became preſently untameable, hard to be exterminated, alſo enemical to the Brain and Nervous Stock; wherefore in each of them, the beginning of the Diſeaſe was to be known rather by the torpor and ſomnolency, than the fervor and heat; alſo the Criſis, though by ſeveral ways attempted, *viz.* by Sweat, Flux, Bleeding, did not happily ſucceed, but for moſt part, the Blood growing turgid with the Critical Motion, endeavoured to transfer the Feaveriſh matter, upon the dwellings of the Animal Spirits; yet it ſelf notwithſtanding, became not putrefied by this means, but that about the ſtanding of the Diſeaſe, both humors (to wit, the Blood, and Nervous Juice) being vitiated, by an impure mixture together, and grievouſly touched, cauſed the event of the Diſeaſe, to be either deadly, or extream dangerous.

CHAP. XV.

Of the Meaſles and Small Pox.

IN the next place, we refer the Small Pox and Meaſles to the Rank of Peſtilential and Malignant Feavers, which indeed are mixt Diſtempers, conſiſting at once according, and contrary to our Nature. As to their Original, they have their Seminary born with us: but as to the effect, they produce preternatural Symptoms, and (as the Plague it ſelf) poyſonous; ſo that they conſtitute as it were a certain peculiar kind of Feavers, proper indeed to men, but after another manner, than *Porphyrius* has aſſigned; for it happens for every man only, and once to be diſtempered with the Small Pox or Meaſles: if perchance any one lives free their whole life, or another more often fall into theſe Diſtempers, they are rare and unuſual events of Nature, which leſſen not common obſervation; yea 'tis fully confirmed, to wit, that all, and only men are obnoxious to the Small Pox and Meaſles, and are wont to be rid of them at one Sickneſs. Concerning the Small Pox, we will treat of them apart from the Meaſles, what the Cauſe of them is, then what Signs and Symptoms they have, and laſtly, what things belong to the Criſis and Cure.

Concerning the Cauſes, we ought to conſider in the firſt place, what is the ſecret leading Cauſe, to wit, which renders only and all Mankind, and that once, obnoxious to this Diſeaſe. Secondly, We will enquire concerning the evident Cauſes, *viz.* by what and how many ways, this latent and occult diſpoſition is wont to be, now ſooner now later, deduced into Act. Thirdly, It ſhall be declared, what is the conjunct Cauſe, to wit, by what motion and alteration of the Blood, the figure of this Diſeaſe is produced.

1. As to the firſt, This diſpoſition or natural prediſpoſition, which inclines humane kind to this Diſeaſe, ſeems to be a certain evil or impurity of the Blood, conceived in the Womb, among the firſt Rudiments of Generation; almoſt all Authors would have this aſcribed to the Menſtruous Blood; which Opinion ſeems not altogether improbable; becauſe in a Womans Womb (otherwiſe than in moſt other living Creatures) there is generated a certain Ferment, which being communicated to the Maſs of Blood, affords to it Vigor and Spirit, and then at ſet periods, procures a ſwelling up, and an excretion of the ſuperfluous Blood; but at the time of Conception, when the *Menſtrua* wholly ceaſe, very much of this Ferment is beſtowed on the *Fœtus* or Child; and its Particles being heterogeneous to all the reſt, as a certain extraneous thing, are confuſed with the maſs of Blood and Humors; with which being involved, and ſeparated one from another, lurk or lie hid a long while; yet afterwards at ſome time, being moved or ſtirred up, by ſome evident cauſe, they ferment with the Blood, and induce to it an Ebullition, and then a Coagulation, from whence very many Symptoms of this Diſeaſe ariſe.

Theſe Fermentative Seeds ſometimes are few and gentle, and ſo involved with other little Bodies, as they do not eaſily appear, and are brought into act; ſometimes they are more and ſtronger; ſo that on the leaſt occaſion they are ripened into this Diſeaſe; hence indeed ſome are taken ſooner, with the Small Pox in their tender years; others more ſlowly, and not till full or more ripe Age; alſo ſome eaſily receive the Contagion, but others converſe often with the ſick without danger. The ſooner that any one hath this Diſeaſe, the more ſecure they are; wherefore Children moſt often eſcape; old men, or ſuch as are of years, are more in danger, *viz.* in Children or young people, Tranſpiration is more eaſie, alſo the habit of the Body more

more firm and healthful. But altho the venomous ſeeds of this Diſeaſe, for the moſt part are wont to be diſperſed or blown away at once, and with one ſickneſs; yet it ſometimes happens, that a part of the infection being ſtill left, the ſick have fallen into this Diſeaſe twice or thrice.

2. The evident cauſe which ſtirs up theſe fermentative ſeeds, and moſt often brings them into act, may be ſaid to be threefold, *viz.* The contagion received from ſome place: the diſpoſition of the Air, and the immoderate perturbation of the Blood and Humors. It is moſt manifeſt by daily experience, that this Diſeaſe doth come upon others, and ſpread abroad by contagion; *viz.* from the infected Body, continually flow *Effluvia*, which being received by other Bodies, preſently like poyſon, they ferment with the Blood, and ſuſcitate or awaken the lurking or ſleeping Seeds of the ſame Diſeaſe, homogeneous with themſelves, and diſpoſe them into the Figure or Idea of this Diſeaſe: neither is the Infection only communicated by contact, but at a diſtance. They who live within the ſame Houſe, or neighbouring to the Sick, eaſily receive the Infection; alſo it is cheriſhed in Cloaths, and diſſipated afar off, and transferred to more remote places. They who are of kin one to another, ſooneſt infect each other; alſo they who are fearful, and extreamly dread this Diſeaſe, more readily fall into it: For by Fear, the Particles of the Infection are conveyed inwardly from the ſuperficies of the Body. At what time the Contagion ſpreads, and that the Small Pox are Epidemical, all other Diſeaſes almoſt degenerate into this. Secondly, a certain peculiar diſpoſition of the Air, notably induces the Small Pox; hence moſt often it becomes popular, and rages ordinarily through whole Regions, Cities and Villages; hence alſo it more often exiſts in the Spring and Autumn: becauſe at that time eſpecially divers manners of little Bodies, and by that means tumultuating flow about in the Air, which we draw in with the Air, and ſo various efferveſcencies of the Blood and Humors, and Idea's of Diſeaſes are raiſed up. Neither doth this Diſeaſe become only more frequent and Epidemical for theſe Cauſes, but alſo it gots a manifold Nature, that ſometimes the Small Pox are deadly, and as it were peſtiferous, and ſometimes they are more mild and benign; to wit, as they have contracted more or leſs of Malignity from the Air; hence alſo ſometimes black and livid Whelks or Puſtles appear, and have much of the Nature of the Plague. Thirdly, Sometimes, though the Tinder of contagion be abſent, and that no malignant Conſtitution of the Air had gone before, yet by reaſon of the Blood and Humors being immoderately diſturbed, the Small Pox do ariſe: ſo I have known ſome to have fallen into this Diſeaſe, from a Surfeit, or immoderate exerciſe, when none beſides in the whole Country about, hath been ſick of it, to wit, the Seeds of this evil, lying hid, without any previous infection, being ſtirred up by a too great fervor of the Blood, and being aſſociated, gathering together, eaſily defile, and infect the whole Maſs of the Blood, with their Ferment,

3. So much for the ſecret leading, and evident Cauſes, but as to the conjunct Cauſe, *viz.* which is the formal reaſon of this Diſeaſe, or the manner of its being made, the buſineſs ſeems a little more intricate. It is commonly wont to be compared to Muſt growing hot, or Beer when it purges in the Vat: for if you put to theſe Liquors any thing of Ferment: as their Particles are heterogeneous, and of wonderful activity, preſently they diffuſe themſelves through the whole ſubſtance of the Liquor, they exagitate the more thick and impure Bodies, againſt which they are daſhed, beat them aſunder, and roul about them, until a flowring being made, they drive the ſame from the intimate embrace or company of the Liquor, to the outmoſt Superficies. After the like manner the heterogeneous Seeds of this Diſeaſe, are thought to ferment the Blood, and then by a certain eruption of Whelks or Puſtles, like the flowring, purifies it. But indeed, if we ſhould more ſtrictly conſider the Buſineſs, there will appear here a great difference; becauſe the infection of the Small Pox, is as it were a Ferment, or corruptive, and compels the Blood to grow hot, not towards perfection, but depravation; for when the Particles of this venomous infection ſtrike againſt the receiving Subject, they preſently raiſe up little Bodies like to themſelves, and born with us, with which being aſſociated, they paſs through the whole Maſs of the Blood, and make it to grow highly turgid, and to boil up, and after ſome time growing fervent, to go into parts, and to be coagulated, *viz.* the diſperſed Seeds of the Poyſon, diſſolve the mixture of the Blood, preſently profligate the more pure Spirits, then they joyn its more thick Particles to themſelves, and by their adheſion, render them as it were congealed: The portions being ſo coagulated, together with the infolded Seeds of the Poyſon, being left by the reſt of the Blood, in its circuit, between the extremities of the Veſſels, are affixed to the skin: by which means, if Nature being ſtrong enough, doth caſt forth the whole poyſon, with the congealed Blood, the remaining Maſs of the Blood, although made poorer, remains however in a condition to continue Life and Health; but if the Blood, being too exceſſively congealed, cannot be purified after this manner; or if portions of the Blood growing together with the Poyſon, do not fully break forth, or at laſt do ſtagnate within, they wholly corrupt the Liquor of the Blood, or elſe being affixed to the Viſcera, and eſpecially to the Heart, they deſtroy their conſtitution and ſtrength.

Portions of the congealed Blood, with the Poyſon, begin to break forth about the fourth day (now ſooner, now later) becauſe Coagulation is not preſently induced, but after ſome time, in

in which the Venom unfolds it ſelf, and ferments the Blood with its Effervency: Firſt, light portions of the infected Bloud, and thoſe but few in number, like to Flea-bites, are fixed in the Skin; quickly after more appear, and thoſe firſt broke forth, by the acceſſion of new Matter, and by the continual appulſion of the congealed Blood, increaſe, and are elevated into a tumor; then theſe Whelks at firſt red, being by degres increaſed, at length grow white, *viz.* the Bloud being thruſt forth of the Veſſels with the Poyſon, by reaſon of the heat and ſtagnation, is changed into Matter: about the ſeventh day after the eruption, the white tumors grow cruſty, into a dry Scab; for the more thin part of the matter being evaporated, the reſt grows hard, which then having eaten, and broke off the Cuticula, or outward thin Skin; falls away from the fleſh or next Skin.

When the infection of the Small Pox is at once impreſſed on the Blood and Spirits, it very rarely can be blotted out, or diſſipated by Medecines, or Bloud-letting; but that its hidden diſpoſition, will break forth into act; wherefore at firſt it diffuſes it ſelf by little and little, and inſpires the maſs of Bloud, as it were with a Ferment, hence an ebullition and growing hot are produced in the whole Body, the Veſſels are diſtended, the Viſcera provoked, the Membranes pulled, until the Seeds of the Contagion, by fuſing and coagulating the Blood, being at length involved with its congealed portions, are thruſt forth of doors. The Eſſence of this Diſeaſe will be better laid open, if that I ſhall recount the Signs and Symptoms, which are to be obſerved in its whole courſe, and ſhall add in order the Reaſons and Cauſes of them, on which they depend; but they are thoſe which either indicate the Diſeaſe being preſent, or that foretel its ſtate and event.

As to the Diagnoſis of this Diſeaſe, by which it may be known, whether any one at firſt falling ſick, will have the Small Pox or not; at that time are to be conſidered, the force of the Contagion, and the concourſe of the Symptoms firſt appearing; for if by reaſon of the evil conſtitution of the Air, this Diſeaſe doth ſpread abroad every where, none then is taken with a Feaver, without the ſuſpition of the Small Pox, eſpecially if they never had them before in their lives; but if this Diſeaſe be more rare, and without fear of Contagion, yet its unlooked for Aſſault quickly betrays it ſelf, by theſe ſort of Signs and Symptoms.

1. There is a wandring and uncertain Feaver, ſometimes ſtrong, ſometimes more remiſs, obſerving no reaſon of increaſe, or growing continually hot, ſo that the Sick are now highly hot, by and by without any evident cauſe, they are without a Feaver; the cauſe of which is, for that the fermentative Seeds are not agitated by an equal motion, but like fire half choaked, now increaſes more, and now are almoſt quelled, and ready to expire; until the burning ſpreading more largely, the flame every where breaks forth.

2. A pain in the Head and Loins, is ſo peculiar a Sign in this Diſeaſe, that it almoſt alone, in a continual Feaver, ſignifies the approach of the Small Pox; the reaſon of which is commonly imputed to the greater Veſſels being very much diſtended by the effervency of the Bloud; but indeed it appears not, wherefore the ſame trouble is not cauſed equally in other parts, by reaſon of the like diſtention of the Veſſels, and wherefore in the Small Pox, more than in a burning Feaver, or in other Feavers, where the Bloud grows more hot, theſe kind of pains ſhould increaſe; yea, it may be obſerved, that great pains, now in the Head, now in the Loins, do urge, when the Blood but little ſwelling up, the Veſſels are not amplified, *viz.* in the beginning of the Diſeaſe, when the Feaveriſh diſtemper is not yet conſpicuous, while the ſick as yet go abroad, and are well in their Stomach, upon the firſt coming on of the Small-Pox, they betray themſelves by theſe kind of Pains. Wherefore, the cauſe of theſe kind of dolorifick pains, ſeems rather to ſubſiſt in the nervous ſtock, *viz.* in the Brain, and ſpinal marrow, and that by reaſon of the membranes, and nervous parts being pulled or hauled by the particles of the poyſon, theſe pains do ariſe. For it is moſt likely, that the innate ſeeds of the Small Pox are chiefly hidden in the Spermatick parts, and that firſt of all, the Contagion lays hold on, for the moſt part, the Animal Spirits; hence, the firſt efferveſcency is ſtirred up in the Juice, wherewith the Brain and nervous parts, but eſpecially the Spinal marrow are watered, and from thence the evil is communicated to the maſs of Bloud; wherefore, this Diſeaſe beginning, the Head and Loins are tormented with cruel pain; afterwards, the venom being tranſlated into the Blood the Feaveriſh efferveſency is ſtirred up in the whole.

3. Great anxiety, and unquietneſs, and ſomtimes a ſwooning, infeſt the ſick, *viz.* by reaſon of the perturbed motion of the Blood, as alſo its equal mixture, beginning to be ſolved, by the Poyſonous ferment, the Blood from thence being apt to ſtagnate in the Heart, and to be hindred in its Circuit, cauſes theſe affections to be thus excited.

4. Cruel Vomiting, alſo when the Ventricle is free from an impure ballaſt of Humors, very often accompanies this Diſeaſe; the reaſon of which is, becauſe the fermentative ſeeds, being ſtirred up into motion, by the little Arteries gaping into the coats of the Ventricle, are depoſed by every appulſe of the Blood, and raiſe up Vomiting, as if the particles of Stibium had been ſwallowed; but afterwards, aſſoon as ſweating being procured, the Poyſon is driven forth outwardly, this Symptom ceaſes, and the Sick are well in their Stomach, without any purging forth of the noxious matter.

5. With

5. With these may be ranked, the Symptoms which shew themselves, according to the various habitudes of the Body, after a diverse manner, as heavy sleepiness, terrors in sleep, deliriums, tremblings, and convulsions, sneezing, heat, redness, a sense of pricking over the whole Body, involuntary tears, a sparkling, and itching of the eyes, a tumor or swelling up of the Face, a vehemency of Symptoms from the beginning, that the Disease seems presently to have attained his strength: the reason of all which may easily be elucidated, if what hath been already said concerning the Symptoms of Feavers be observed; with respect to the diverse tempers of the Sick, their habit, and age, as also the condition of the year.

2. As to the Prognosis of this Disease, by the Symptomatic Signs, it is indicated to be either salutary, or mortal, or of a doubtful Event.

1. The business promises well, when this Disease has benign circumstances; to wit, when it happens in a good constitution of the Air and Year, and at what the Small Pox are less malignant and pestilential; as in the year 1654. at *Oxford*, about Autumn, the Small Pox spred abundantly, yet very many escaped with them: but before, in the year 1649. this Disease was more rare, yet most died of it. Also, there is less danger, if it should happen in the age of Childhood or Infancy, or in a sanguine temper, and good habit of Body, or in a Family to whose Ancestors the Small Pox have not proved mortal: Resides, if in the whole course of the Disease, the Symptoms prove laudable, if in the first Assault, there be a gentle Feaver, without cruel Vomiting, Swooning, Delirium, or other horrid Distempers; if the Feaver about the fourth day be allayed, with the Symptoms chiefly urging, and then some little red spots begin to appear; if on the second day of the coming forth of those little red spots, they become more conspicuous, which afterwards grow together by degrees into little Pimples, and are ripened into Matter; if about the tenth day, or thereabouts, after the Eruption, the white tumors begin to scab, and by little and little from thence to fall off; if after their first coming forth, the Small Pox are soft, distinct, few, round, sharp-pointed, lying only towards the skin, and not in the inward Parts, you may be confident the Sick will do very well, and is in a good condition.

2. The appearances, which in the Small Pox, signifie the business to be suspected, and full of danger, are of this sort; if there be a malignant constitution of the Air, that this Disease becomes Pestilential, and many die of it; if men of more ripe years, or middle Age, be taken with it; if it happens in a cold and melancholick temper, or in an impure or evil humor'd Body, where the Bloud is not rightly circulated, nor transpiration truly performed, or if the Hypochondria or Præcordia are obstructed, some of the Viscera infirm, or troubled with an Ulcer, or if the habit of the Body be too fat, the Small Pox happen not without great danger of Life; nor is it less to be feared, when presently after the beginning, a great Feaver, cruel Vomiting, Swooning, a dejection of strength, Phrensie or Delirium come upon them, and that these desist not, upon the full coming forth of the Small Pox, for these signifie a too great perturbation in the Bloud and Humors; also, a confusion and contumacy of the morbifick matter, which can neither be subdued, nor easily separated from the mass of Bloud, or equally extruded from it: if there be an anxiety, and great unquietness, with an inordinate boiling up, and growing hot of the Bloud; also a great thirst, a difficulty of breathing, also a flux of the Belly, or Dysentery, they shew that sweating is hindred, and that the malignant humors restagnate towards the inward parts: The small Pox breaking forth slowly, argue the crudity and untameableness of the matter, and the impotency of Nature, and 'tis much more a sign, if they come forth double, and continued, in too excessive a quantity and confusion, and also if there be a disordered expulsion, and irregular, of that matter, when not in certain issues, but every where undistinguishable. The Pox being hard, signifie the incoction of the same matter, being depressed, a weak expullion; and they are the worse, if in the midst of them appear black spots; or if purple spots familiar to the Feaver, or the Plague, are sprinkled among the Pox, they indicate a great malignity and putrefaction of the Bloud, such as is wont to be found in the Pestilence. Lastly, the Pox being black, livid or green, are of an evil omen, because, besides the coagulations of the Bloud, they argue its deadlinesses and corruptions, as in a Gangreen or Pestilent-Plague-Sore; if when the small Pox being come forth, they presently grow dry, and the swelling of the parts remit, it shews a going back of the malignant matter, or of the congealed Bloud, with the Poyson, and a restagnation of it to the inward parts; from whence, unless a more free Diaphoresis or sweating be excited, that it may be thrust forth of doors again, Death for the most part quickly follows: For from hence the Bloud being more coagulated, enters into putrefaction, also it is apt to be hindred in its motion, and to stagnate in the Heart and Vessels. If after the coming forth of the small Pox, a flux of the Belly, or a bleeding at Nose, comes upon them, it is an evil sign, because, by this means the Venom driven outwardly, is again called back inwardly; but sometimes I have observed these Symptoms to have hapned, with great ease to the sick, *viz.* Nature being before oppressed and burthened; after this

manner, part of the burthen being as it were detracted, ſhe was eaſed; wherefore, ſhe buckled her ſelf to the work of ſweating, and more readily expedited the expulſion of the noxious matter.

As to the Curative part, ſince the ſtadium or courſe of this Diſeaſe, hath three Seaſons, as it were ſo many meaſures, diſtinct one from another, the Curative intentions ought to be accommodated to each of theſe; wherefore the Curative Method concerning the Small Pox, teacheth firſt, what is to be done ſo long as the Bloud boyls up, and grows hot inwardly, with the motion of the fermentative matter, and before the ſmall Pox appear, which period for the moſt part is finiſhed in four or five days.

Secondly, what means or manner of Diet and Phyſick is to be inſtituted, after the coming forth of the ſmall Pox, until the ſtate or ſtanding of the Diſeaſe, *viz.* whilſt the Whelks or Pox come to the height, and being fully ſuppurated or ripened, begin to dry.

Thirdly and laſtly, what we muſt obſerve in the declining of the Diſeaſe, even whilſt the ſmall Pox growing dry, fall off.

1. As to the firſt, let the Intention be, that we may carry away every impediment of Nature, whereby the Bloud being infected by the Ferment of the ſmall Pox, and apt to be coagulated, may yet retain an equal motion in the Heart, and without ſtagnation in the Veſſels, and growing hot, may expel forth of doors the congealed portions with the Poyſon; in the mean time, there muſt be a caution, leſt the work of fermentation or growing hot be any ways hindred, or too much provoked; for by this the Maſs of the Bloud is agitated into congealed portions, more than it ought to be; by that other it is reſtrained too much in its motion, nor are the invenomed Particles ſent forth of doors with the congealed Bloud; Nature in the work of ſecretion and expulſion, is wont to be hindred by too great an heap of excrements in the Viſcera, or by the abundance of Bloud in the Veſſels; wherefore upon the firſt aſſault of the Diſeaſe, care muſt be taken, that if need be, an evacuation by Vomit or Stool, be timely procured; but only more mild Purges, and gentle are to be uſed, which do not too much provoke, or diſturb the Humors: wherefore, at this time, Purges, Emeticks, or Clyſters, now theſe, now thoſe, take place; alſo the letting of Bloud, if there be a fulneſs, is performed with good ſucceſs.

During this growing hot of the Bloud, Diet ought to be inſtituted ſlender and moderately cooling, *viz.* Barly-Broth, or Grewel of Oatmeal, Poſſet Drink, Small Beer, or the like: Fleſh, and Fleſh-Broths are to be avoided, whereby the Bloud, by reaſon of the too great plenty of ſulphureous Food, may be enkindled more than it ought; alſo all cold, and ſharp or acid things are hurtful; for theſe congeal the Bloud more, and contract the little mouths of the Veſſels by their aſtriction or binding nature, that the ſmall Pox come forth leſs freely; alſo hot things, and Cordials are cautiouſly to be adminiſtred; for by theſe the Bloud and Humors are too much agitated, and driven into confuſion.

2. When the Small Pox begin to appear, there are three things, which by a conſtant Rule we preſcribe to be performed to every ſick perſon, to wit, that a ſoft and gentle Sweat be ſtill continued in the Bloud; alſo, that the Throat and Eyes may be preſerved from a too great eruption of the Small Pox. That the Bloud lightly growing hot may emit the Small Pox, Decoctions of Figs, Marigold flowers, and ſhavings of Harts-horn in Poſſet-drink, are commonly preſcribed, and the uſe of them is general for a long time, almoſt with all people; for the ſame intention, we are wont ſometimes in a day to give them moderate Cordials; but the more hot and ſtrong are carefully to be ſhunned: Purging and Bloud-letting here are moſt wickedly enterpriz'd, and theſe, though Neceſſity compelled, Phyſicians dare not meddle with for fear of blame: For to defend the Throat and Guttural parts, we put on the outer Skin a defence of Saffron dipped in Breaſt-Milk, and ſewed in a Rag; for theſe, by opening the pores, draw away the venom outwardly, from the moſt inward part or the Throat; alſo for this end, we adminiſter Gargariſms, and things to waſh the Mouth, which by their reſtriction, reſtrain the coming forth of the Small Pox within: we defend the Eyes with peculiar Medecines, of Roſe-water, and Breaſt-Milk, with Saffron, and ſuch like, frequently iterated, from the incurſion of the Small Pox: Beſides theſe, ſometimes certain moſt horrid ſymptoms do trouble, which muſt be timely helped with convenient Remedies; ſometimes there are preſent, Watchings, Phrenſie, Bleeding at Noſe, Vomiting, Looſneſs, and a falling back of the Small Pox: for theſe and divers others, as occaſion ariſes, a prudent Phyſician knows how to provide; in which however there is need of great caution, leſt whilſt we take care of the ſmaller matters, the great work of Nature ſhould be diſturbed by a too great moleſtation of Medecines. For in all this time there is one and a continued Criſis: wherefore nothing is to be medled with raſhly. There is required the moſt care and circumſpection of the Phyſician and Nurſes, or thoſe that adminiſter to the Sick, when this Diſeaſe is at its height or ſtanding, *viz.* leſt that when the Small Pox be fully come forth, and brought to their greateſt height, tranſpiration ſhould be hinder'd; for then the ſick are in danger of renewing the Feaver,

and

and of the reſtagnation of the Malignant matter within, whilſt we ſtudy to prevent the one, we for the moſt part bring on the other.

3. When the Diſeaſe ſhall be in its declination, and the Small Pox begin to wither and ſcab, the buſineſs for the moſt part is out of danger, nor is there much need of a Phyſician; let the ſick, though he grow very hungry, content himſelf ſtill with a ſlender Diet, and without Fleſh: if the Scabs fall off ſlowly, we are wont to ripen them with Liniments, and peculiar Medecines, to make them fall, and care ſhould be taken that they leave not behind them too great Pits: after the Sick having the Scabs every where fallen off, and are able to riſe and walk about the Chamber, the filthy Excrementitious Matter in the Bowels, is to be carried away, by two or three times Purging, and then they may be permitted to uſe a more plentiful and ſtronger Diet.

The Meaſles are ſo much akin to the Small-Pox, that with moſt Authors they have not deſerved to be handled apart from them, but that either Diſtemper have been treated of together, after the like manner and method. The Eſſence and Cure differ at leaſt accidentally, or as they are greater or leſſer; becauſe in the Meaſles the Whealks riſe not up to ſo great a Bulk, neither are they ſuppurated; wherefore the Sickneſs is ſooner ended, and with leſs danger. this Diſtemper is wont moſtly to ſpread upon Children, more rarely amongſt thoſe of years, or old men; alſo thoſe who firſt have had the Small-Pox, are not afterwards ſo obnoxious to the Meaſles, but in moſt things, either Diſtemper are of kin, *viz.* the Evil being contracted in the Womb, diſpoſes men only, and all men once to the Meaſles; the malignant conſtitution of the Air, and ſometimes a Surfeit, and moſt often the Contagion, are wont to bring the hidden diſpoſition into act; there are preſent marks of malignity, and the Sickneſs oftentimes becomes Epidemical, and with Mortality and Contagion.

That I may briefly contract the Sum of the Matter, it ſeems that the Meaſles are a certain lighter flowring, of an extraneous ferment, contracted from the womb; by which, ſome Particles being ſtirred up into motion, make the Blood lightly to grow hot, and to be a little coagulated; wherefore the Marks from thence ſpread abroad, are diſſipated without any breaking of the Cuticula, or outward Skin, by evaporation only; but the Small Pox are a more full and ſtrong agitation, according to all the Particles of the ſame Ferment, which cauſing a great ebullition and coagulation of the Blood, produces far more full whelks, and greater in bulk, and not to be diſſolved, but by ſuppuration, or growing into matter: when the Small Pox precede, they are not only exempt from the ſame Diſeaſe any more, but alſo from the Meaſles, becauſe they conſume only ſome of the Particles of the Ferment, leave ſtill a diſpoſition to the Small Pox; wherefore old men, or thoſe of years, are not ſo readily infected with the Meaſles, becauſe they are either freed from the contagion, by having before had the Small Pox, or elſe the Infection of this more light Diſeaſe, is eaſily reſiſted by their more ſtrong Spirits.

It were eaſie to illuſtrate the afore-cited Doctrine concerning the Small Pox, with Hiſtories and Obſervations of the Sick, becauſe there is no Diſeaſe beſides can ſupply with a greater plenty of Examples, or variety of Accidents; but of the great number of this kind, I ſhall only propoſe in this place a few Caſes, and thoſe remarkable for ſome irregularities.

It is a uſual thing to handle all that are ſick of the Small Pox, with a like, or wholly the ſame method of Curing, and manner of Diet; wherefore, a Phyſician is rarely ſent for to the common ſort, but the buſineſs is wholly committed to ſome Women, profeſſing themſelves skilful in this Diſeaſe; and theſe are wont to boil in their Broths, and all the Suppings of the ſick, Marigold-flowers, ſhaving of Harts-horn, and ſometimes Figs; alſo every night to adminiſter a Bolus of Diaſcordium; and they who grow not well by this kind of Government, though not neglected, yet are affirmed to be incurable, by reaſon of the cruelty of the Diſeaſe. But truly this kind of Practice is not convenient for all alike, nor to be adminiſtred to every one indifferently; as theſe two following Hiſtories will make manifeſt.

A young Man, about 20 years of Age, of a ſlender Body, and more hot temperature, began to be Feaveriſh in the beginning of the Spring, at firſt cruel Vomitings, an oppreſſion of the Heart, and frequent changes of heat and ſhivering, a pain in his Loyns, a diſturbance of his Fancy, and Wakings infeſted him; on the third day, the Small Pox appearing, thoſe Symptoms remitted, but ſtill the Feaver, with heat and thirſt continued. Not only the accuſtomed Decoctions in this Diſeaſe, but alſo a moſt elegant Julep, of a moſt grateful taſte, were ſo nauſeous and troubleſome to him, that he would not ſo much as taſte the ſame, but with a great deal of trouble; as often as he took going to ſleep, Diaſcordium, or any other more temperate Cordial, for the continuing his Sweat, though in a very little quantity, the night following he was without ſleep, and in great diſquiet; and then in the beginning of the morning a Bleeding followed, by which means indeed, the Small Pox being full come forth, the Life of the ſick was in great danger, by reaſon of this occaſion hapning once or twice; where-

fore, when I had found by obſervation, his Blood apt to grow immoderately hot, by ſo light a provocation, I inſtituted this method as occaſion ſerved. All Medecines being let alone, he took for the quenching his Thirſt, ſmall Beer, and ſimple Almond-Drink, at his pleaſure: for his Food, becauſe he vomited back all Oatmeal Grewel, or Barly-Broth, he eat only Apples roaſted tender, and dreſt with Sugar and Roſe-water, often in a day. Nature being contented with this ſlender ordering, and being ſeen to be diſturbed with any other thing performed happily its work, that the ſick perſon grew well, without any grievous Symptom afterwards, the Small Pox from thence ripening, and then of their own accord falling off.

In the middle of Autumn of the former Year, a Gentile Young Man, being endued with a ſharp Blood, and obnoxious to a frequent bleeding at Noſe, fell ſick of the Small Pox; his Blood of its own accord grew immoderately hot, that the Whelks very quickly broke forth over all his Body: Poſſet-Drink, with Marigold-Flowers, and other uſual things boiled in it, alſo Juleps, or any Cordials, though temperate, and gently provoking Sweat, moſt certainly ſtirred up a Flux of Blood in this Perſon; wherefore I ordered the like manner of Diet, as in the ſick perſon before cited, by which he found himſelf better; however, in the very ſtate or ſtanding of the Diſeaſe (when the Small Pox being fully come forth, by reaſon of a more difficult tranſpiration, the Feaver is wont to be ſomewhat renewed in all) this ſick man fell into a moſt plentiful Bleeding; that after a large profuſion of Blood, the Small Pox began to flagg or fall: After that Remedies, very many, were tried in vain, for the ſtaying of the Blood, at length a little Bag being hung about his Neck (in which was a Toad dried in the Sun, and bruiſed) he firſt, and immediately perceived eaſe; though the bleeding was by this means ſtayed, and not any more returning (whilſt he conſtantly wore this peculiar Medecine in his Boſom) our ſick Man ſtill uſing a moſt thin and cooling Diet, grew quite well; that indeed from hence it may appear, that although the Blood in this Diſtemper, is apt to be greatly coagulated, yet ſo long as the vital Spirits, being ſtrong and robuſt, are able ſufficiently to execute their government, they endeavouring by their proper ſtrength or forces, do beſt of all ſeparate and thruſt forth the congealed portions of the Blood, as it were by a certain skilful ſeparation; and this work is moſt of all hindred, when the ſame Spirits are too much irritated by Cordials, or more hot Food, and agitated into confuſion: But in the Plague it happens otherwiſe, becauſe in this, if any delay be granted, the Spirits themſelves are preſently profligated by the Venom; wherefore, here they muſt fight cloſe and quick, when in the Small Pox, the Phyſician does his buſineſs better by delay.

Concerning letting of Blood, at the inſtant breaking out of the Small Pox, it is very dubious; formerly, among our Countreymen, this was eſteemed a wicked buſineſs, neither were they wont to admit of Phlebotomy under any pretext of neceſſity: but of late, experience having taught us, in ſome caſes, it is found, that to let Blood, hath been wholly profitable and neceſſary; which evacuation however, if it ſhould be adminiſtred indifferently in every conſtitution, or when this need ſhould be, it ſhould be performed in too large a quantity, by that means oftentimes very great dammage ariſes.

Some years before, I viſited a young Gentlewoman, of a florid countenance, and more hot temperature, growing into a Feaver, after the fourth month of her being with Child; ſhe was troubled with a cruel Vomiting, a moſt cruel pain of the Loins, beſides with moſt ſtrong heat and thirſt; her Pulſe was ſwift, with a ſtrong and vehement vibration or beating; altho the Small Pox had never been in that Place, yet theſe Symptoms gave no light ſuſpition of this Diſeaſe; however, its great effervescency indicated that Blood ſhould be taken away; wherefore I took away about ſix ounces preſently, upon which the heat remitted ſomewhat, yet the Vomiting, with a cruel pain in the Loins remained ſtill: At the hour of ſleep, I gave her a Cordial Bolus, with half a grain of our Laudanum, by which means quiet ſleep followed, with a pleaſant ſweat, and an allaying of all the Symptoms: the next morning the Small Pox came forth, with which, although the ſick Gentlewoman was greatly diſtempered, yet ſhe grew well without any dangerous Sickneſs, or fear of miſcarrying, and went out her full time.

The laſt Autumn, a ſtrong Man, of an active and robuſt conſtitution of Body, yet of a pale Countenance, and more cold Temper, fell into a Feaver; on the ſecond day he was tormented with heat and thirſt, and a moſt cruel pain in his Loins: when I had preſcribed Blood to be taken in a ſmall quantity, the unskilful Chirurgeon, who was ſent for, took from him almoſt half a pound; a little after, the ſick man began to be all over in a cold ſweat, on a ſudden to loſe all ſtrength, to be troubled with a ſhivering, a weak Pulſe, and unequal, and frequent ſwooning. At this time being ſent for, I gave him a temperate Cordial, to be taken frequently. His Spirits and Pulſe being thereby reſtored, the Feaver was renewed, which afterwards, for ſome days, yea, weeks, exerciſed the ſick man after a very irregular manner; for he was wont for three or four days to grow very hot, alſo to be infeſted with thirſt, watchings, Head-Ach, and other Symptoms, then to be troubled all over with a copious and critical

cal ſweat, by which indeed for half a days ſpace he found himſelf better; but from thence, the Feaver ſtill growing worſe, heaped together again new matter, till it was diſperſed by another Criſis, and then another. After that he had been thus feaveriſh for at leaſt twenty days irregularly, at length the Small Pox began to come forth in ſeveral parts of his Body, here and there, and then the Feaver wholly remitted; yet within few days, by reaſon of ſome Errors committed in his Diet, very many of the Whelks began to fall down again, few of them only being brought to maturity: However, inſtead of the ſubſiding ſmall Pox, a mighty Bubo grew up behind his right Ear; from which, being ſoon ripened, and broke, a great plenty of Matter flowed forth for many days, and ſo at length the Corruptions of the Blood, unable otherwiſe to be diſſipated, were carried forth by degrees, and the ſick Perſon recovered perfect Health.

CHAP. XVI.

Of Feavers of Child-bearing Women.

VUlgar Experience abundantly teſtifies, that the Feavers of Women lying in are very dangerous, beyond the diſpoſition of other common Feavers: alſo that the ſame differ very much, as to their Eſſence, from both a ſimple and putrid Synochus, plainly appear from their ſigns and ſymptoms rightly weigh'd: wherefore, I believe it not to be from the matter, to handle after Malignant Feavers, the acute Diſeaſes of Women lying in, being exceeding near of kin to thoſe, for their mortality or perniciouſneſs. Yet, before I ſhall enter upon the unfolding theſe Diſeaſes, it behoves us to conſider their Subjects, *viz.* the Bodies of Women in Child-bed, after what manner they are prediſpoſed, and by what proviſion they are made obnoxious to theſe kind of Sickneſſes.

Concerning this, the firſt thing that offers it ſelf, is, that the Flux of the menſtruous Blood is wholly convenient to be ſuffered by human kind, and at this time for Women, concerning whoſe Nature and Original we ſhall not enquire in this place; but it ſhall ſuffice to note, that in them, the particles of the Blood to be periodically thruſt forth, are very Fermentative; which, if retained in the Body, beyond the wonted manner of Nature, are very often the cauſe of many Diſeaſes; unleſs only when a Woman conceives with Child. For all the time of her being big-bellied, the monthly Flowers are ſtopped without any incommodiouſneſs; and in the mean time, Milk, or the alible Juice, is diſpoſed in great plenty, about the parts of the Womb, for the nouriſhment of the Child; but after the Birth, this daily ſuppreſſion of the Monthly Flowers is recompenſed by a copious flowing forth of the Lochia, or what comes away after the Birth; and the Milk within three days having wholly left the Womb, ſprings forth plentifully into the Breaſts: at which time, Women lying in, are wont to be troubled with a ſmall Feaver. If that the Milk be driven away from the Breaſts, it reſtagnates again towards the Womb, and is thruſt forth, together with the Lochia, under the form of a whitiſh humor. In the mean time, the Womb, after the Birth, becomes ſubject to various Diſtempers; for oftentimes its tone is hurt, the unity is diſſolved, and many other Accidents are induced, which render Women lying in, ſubject to danger: wherefore, that their acute Diſeaſes may be rightly unfolded, it is convenient to conſider chiefly theſe three things, *viz.* Firſt, The Nouriſhment of the Child, or the Generation of Milk, both in the Womb, and in the Dugs, and the Metaſtaſis or tranſlation of it from one to another. Secondly, The purging of the Mothers Blood, or the Profluvium of the Lochia, after a long ſuppreſſion of the Menſtrua. Thirdly, The condition of the Womb after the Birth, and its influence on other parts of the Body. And theſe being premiſed, we will ſpeak of the Feavers of Women lying in, *viz.* both the Milky and the Putrid, called, and that deſervedly, malignant, by reaſon of its deadlineſs.

Firſt, the Milk and nouriſhing humour, being heaped up in the parts of the Womb, for the nouriſhment of the Child, are of a like Nature, though ſomewhat different in conſiſtency. Milk is indeed more thick, becauſe it ought to be received in at the mouth, and to be kept in the Ventricle, and afterwards its more thin portion to be conveyed to the maſs of Blood. The other alible Juice is more thin, and like the Water of diſtilled Milk, becauſe it is immediately poured into the Blood of the Embryo, through the umbilick Veſſels, without any previous digeſtion. Either Juice is ſuppoſed to come from the Chyle freſh made in the mothers ſtomach; what is repoſed or laid up in the Breaſt, is more thick and white, by reaſon of the more thin or open

ſtrainer,

ſtrainer, and coction in the greater Glandula's; on the contrary, it happens in the Womb otherwiſe, where the Glandula's are ſmaller, and the ſtraining more cloſe. But there is a great diſagreement among Authors, concerning the paſſages, by which this Humour is carried, both in the Breaſts, and into the Cake of the womb. Some contend, that Milk only is begotten of the blood, more plentifuly cocted in the glandula's, which yet, by reaſon of the immenſe diſpenſe of Milk, which conſiſts not with the Blood, this ſeems not probable. Others affirm, that the Chyle, or Milky humor, is immediatly convey'd from the Viſcera of concoction, through occult paſſages, without any alteration, into either receptacles: But in the mean time, while theſe paſſages lie open, it ſeems indeed to me more likely, that from the meat taken into the Mothers Stomach, a portion of the Chyle thence made, is preſently ſupped up into the Veins, which having obtained the Vehicle of the Blood, before it be aſſimilated by it, is laid up in the Glandula's, deſtinated here and there for the receiving of it, being carried by the Arteries, and laſtly ſeparated from the Maſs of Blood; for as it appears, that Drink being plentifully taken, preſently paſſes through the whole Maſs of Blood, and is rendred by Urine like Water; and as old Ulcers, by means of the Blood coming between, prey upon the nutritious Humor, from the whole Body, and powr it forth under the ſhape of a putrified Matter, why may not the alible Juice in like manner, being ſtrained by the Collander of the Glandula's, before it has indued the colour of Blood, go into a Milky Humour? This indeed ſeems more probable, becauſe, whilſt the Milk is carried from the Womb into the Breaſts, and on the contrary, paſſing through the Maſs of Blood, it is wont to ſtir up a perturbation through the whole, with a Feaveriſh Intemperance; beſides, in the firſt days, after the Birth, when the Glandula's do leſs rightly perform the Office of Secretion; Beaſts, who have not the Lochia, give a bloody Milk, which is drawn forth of their Udders, that is, mixt with Blood, by reaſon of the plenty of it flowing forth together.

Secondly, As to what belongs to the Menſtrua being ſuppreſſed, in the time of being with Child, and the Lochia plentifully coming away, after being Delivered, we ſay, that after the Conception of the Child, the Menſtrua ought to be ſuppreſſed by Divine Deſignation, for that the flowing of them often cauſes Abortion; then, becauſe the Veſſels are filled by a continual ſtilling forth of the alible Juice into the parts of the Womb, the Maſs of Blood doth not ariſe into ſwellings up, to be allayed by the Menſtruous Flux. For the ſame reaſon, Women for the moſt part, have not their Courſes ſo long as they give ſuck. Perhaps in ſome, indued with a more hot Blood, the monthly Courſes flow, both whilſt they are big-bellied, and in the time of their giving Suck, but that more rarely, and is wont not to happen without trouble; yet in the mean time, the Menſtrua being ſuppreſſed, during the time of being with Child, becauſe much leſs of the nutritious Humor is expended at that time for Milk, they much more deprave the Blood, than the ſame being reſtrained at the time of ſuckling the Child, are wont to do: yea, from them being long ſuppreſſed, in the former condition, an, as it were, envenomed taint is impreſſed on the Maſs of Blood, which, unleſs it be purged forth by the daily Flux of the Lochia, preſently after being brought to Bed, produces grievous, and almoſt malignant Diſtempers. Wherefore, that I may give my Opinion of the flowing of the Lochia, I ſay, that this Bleeding proceeds immediately from the Veſſels being broken, by which the After-Birth did ſtick to the Womb, and that by this way, the excrementitious Blood and Humors being partly heaped up about the Womb during the time of being with Child, and partly flowing from the whole maſs of the Blood, are evacuated, *viz.* whilſt the Womb at firſt intumefied in its bulk, falls down preſently after the Birth, and is contracted into a leſſer ſpace, the Blood is plentifully preſſed forth from the Veſſels opening into it. But beſides, foraſmuch as during the ſuppreſſion of the Courſes, the bloody maſs is imbued with very fermentative Particles, aſſoon as after the Birth, the mouths of the Veſſels are opened, forthwith, as it were at the inſtant of a more large Flux of Monthly Courſes, the whole Blood grows hot (even as Muſt or new Wine upon the opening the Bottle) and endeavours to purge forth the highly fermentative particles out of its boſom, by the going away of the Lochia, as it were the flowring: And therefore, beſides the Blood, which in the firſt days oftentimes flows pure, by reaſon of the freſh opening of the Veſſels, afterwards is ſifted forth matter very much diſcoloured, *viz.* livid and green, and this very ſtinking. This kind of Flux is wont to continue at leaſt for fourteen days, yea, in ſome for a month; and if that by reaſon of any error, it be ſtopped before the maſs of Blood be throughly purified by ſuch flowring, preſently a Feaver, very dangerous, with horrid proviſions of Symptoms, is wont to be induced: of which we ſhall ſpeak anon in its proper place.

The third Conſideration, previous to the Doctrine of Feavers, belonging to Women in Child-bed, is chiefly about the Womb it ſelf; to wit, how it is affected after Child-bearing, and what influence it has on other parts of the Body. As to the firſt, there are chiefly two Accidents, upon which the acute Diſeaſes of Women in Child-bed very much depend, *viz.* Firſt, The falling down of the Womb, or the reduction of it, from the bulk of ingravidation, to its natural

natural Site and Magnitude: Secondly, the ſolution of the unity, within its cavity, by reaſon of the breaking of the connexion, or tying to the Cake of it, or After-Birth. When the Child, with what wraps it about, is put forth, preſently the ſides of the Womb it ſelf, before very much amplified or enlarged, do mutually cloſe, and by the help of the Fibres, leiſurely contract themſelves into a narrower ſpace; by reaſon of this kind of contraction, the Blood and Corruptions, or Matter are plentifully preſſed forth from the Veſſels and Pores of the Womb, and are thruſt forth with the Lochia. But ſometimes it happens, by reaſon of ſome preternatural thing contained in the Womb, as part of the Secondine, or After-Birth, a Mole or piece of Fleſh, Clodders of Blood, *&c.* alſo, if there happen after a painful Birth, a Contuſion or great Dilaceration, that the Womb cannot rightly draw it ſelf together, but by an inverſe motion of the Fibres, aſcends upwards, and is lifted up into a bulk; alſo the membranes being affected with a Convulſion, it ſelf is ſtill tormented with Torments, as if it were yet in travel; which kind of Diſtempers, if they long continue, by reaſon of the Orifice of the Womb being tied together, with the Convulſive motion, the Lochia are oftentimes ſtopped alſo: from hence grievous Symptoms follow, and very often the Feaver is either firſt excited, or it happens, being for ſome other cauſe induced, to be rendred far more dangerous. Secondly, as to the ſolution of the unity, from the Cake of the Womb being broken, it comes to paſs, that the Birth, either at its juſt time, or precipitous, being too much haſtened; then the Secundine is caſt forth, either whole, or being torn, or pull'd away, part of it being left behind, it is cut off as it were in half. If the Child be born at its juſt time, and the Birth, with what enwraps it, comes away from the cavity of the womb, as ripe fruit from a Tree, whole, and without violence, the mouths of the Veſſels are ſomewhat unlocked, and the Lochia moderately flow; but from hence no grievous Symptoms is to be feared: but if the Child, not being yet ripe for the Birth, is pulled away, or breaks forth as it were by force, although the Cake, with the membrane is pulled away whole, yet the Veſſels being torn, a greater hemorrhage or bleeding, and at length an ulcerous diſpoſition follows, the little mouths of the Veſſels ſpewing forth a ſtinking matter. If that part, or the whole Secundine ſticks to the ſides of the Womb, , after the Birth, it there putrifies, and ſends forth very ſtinking matter or corruption, and ſtirs up wicked Diſtempers: oftentimes the Orifice of the Womb is ſhut up, and retains within gobbets of clodder'd Blood, little pieces of Membranes, or Fleſh, which putrifying, by reaſon of the heat, impoyſon the Blood and Humors, flowing together to that place, by Circulation, from the whole Body; alſo, by a troubleſom itching or provocation, they ſtir up the parts of the womb, being ſo very ſenſible, into Convulſions.

When therefore hurt is brought to the Womb from Child-bearing, after the aforeſaid ways, the ſame is quickly communicated to other parts, not without trouble to the whole Body; which thing indeed is wont to be done by a double means. For firſt, this happens, becauſe the Lochia being hindred from being thruſt forth, preſently reſtagnate or flow back upon the maſs of Blood, and infect it as it were with a virulent taint: moreover, from the contents putifying in the Womb, either the ſubſtance it ſelf of the Matter, or the Particles coming away from the cadaverous ſubſtance, are mingled with the Blood, and nervous Juice, paſſing through that place, and quickly infect their whole Liquors. Secondly, Hyſterical Diſtempers are more largely extended, by reaſon of the notable conſent, which happens between the Womb and the Brain, with the Fibres and Membranes of the whole Body, by the means of the nervous paſſage; for when the extremities of the Nerves, planted about the parts of the Womb, are driven into Cramps and Convulſive motions, by reaſon of the preſence of ſome hurtful humour, the Convulſions there received, preſently creep more largely upwards, by the endeavours and circumduction of the Nerves towards the Brain; and ſo it happens to the Viſcera to be ſucceſſively inflated, and cruelly haled together, and the Brain it ſelf at length to be pierced, and its functions to be as it were overwhelmed; hence from the convulſive motions, ariſing about the Womb, an inflation of the Belly and Hypochondria, a rumbling, vomiting, ſobbing, and ſtreightneſs of the Præcordia, difficult breathing, a ſenſe of choaking, and oftentimes a ſtupor, and want of Speech, or at leaſt ſome of theſe are excited: nor does the Tragedy ſo eaſily leave, but that alſo the Brain being hurt, by the continuance of the Diſtemper, by that means, the evil is retorted upon other parts, that oftentimes the whole nervous ſtock is compelled into irregularities of motions; for what commonly is ſaid to be done by vapors, and the Diſtemper, called the aſcent of vapors, creeping from the nether parts, to the upper, is nothing elſe than the parts of the Membranes and nervous paſſages, being ſucceſſively driven into Convulſions. Further, in theſe ſort of Diſtempers, the hurt action doth not always begin, or is at firſt perceived in that Region or Place where the hurt is inflicted, neither do the paſſions which are called hyſterical, proceed only from the Womb; for ſometimes the trouble is immediately brought from the Brain, or the convulſions and contractions begin in the extream parts, and ſometimes the extre-

extremities of the Nerves, ſomewhere in the Viſcera, as the Stomach, Spleen, Reins, no leſs than the Womb are haled; in which, irregularities being ariſen, they are continued into the neighbouring part, and from thence to the Brain; from whence again the Convulſions are reflected to other parts, and not ſeldom through the whole Body. Juſt ſo the buſineſs in Child-bearing Women, and with others in Feavers, as I have often obſerved; to wit, ſome by reaſon of their Womb being evilly affected, but others by reaſon of a Feaveriſh matter fixed in the Brain, by a critical metaſtaſis or tranſlation, fall into Paſſions like to the hyſterical. And theſe things being rightly præpenſed, concerning the prævious proviſion, in the Feavers of Women in Child-bed, there is not any thing that we ſhould ſtick at in the entrance more, ſo that we take notice that the bodies of Women lying in (eſpecially thoſe who are feeble, and of a more tender conſtitution) are debilitated, chiefly after a difficult and hard Labour; ſo that, by reaſon of this occaſion only, they eaſily conceive feaveriſh intemperatures, and being brought in by this or any other means, they are hardly able to bear them. We will next ſpeak of the Feavers themſelves, with which Women lying in, are wont to be ſick, of which Diſtempers there are commonly recounted as it were three kinds, *viz.* the Milky Feaver, the Putrid, the Symptomatic, or of that manner by a certain borrowed ſymptom, but is chiefly marked with the Pleuriſie, Squinancy, or the Small Pox: of which we will diſcourſe in order.

The Milky Feaver.

WE have already ſaid, that as yet it was uncertain of what matter Milk was immediately made, and by what paſſages it is carried into the Breaſts, moreover when this part appears not at all to anatomical inſpection, I am of the opinion, that the Milky Chyme, being made out of Aliments in the Bowels, and from thence confuſed to the Bloud for nouriſhing Juice, is preſently again, for the moſt part of it, ſeparated from its maſs by the help of the Glandula's in the Womb, or in the Breaſts, that it might ſupply the Child with nutriment, either in the Mothers Belly, or in her boſom by the Breaſts. In the time of going with Child, although the greateſt part of this is derived to the Womb, yet in the laſt months, a little quantity of it is laid up in the Breaſts; but about the third or fourth day, after being brought to Bed, the Milk is more plentifully carried into the Breaſts, and as it were with a certain force, that it quickly fills them to a ſtretching them forth, and begins to be troubleſom. At this time, Women lying in (though not all, yet moſt) are wont to be troubled with a feaveriſh intemperature, with thirſt, heat, and an inquietude of the whole Body, they complain of a pain very troubleſom in the Back and Shoulders, of a fulneſs and burning of the Breaſts: and unleſs the Milk be diligently drawn forth, it being too much congeſted or heaped up, oftentimes brings forth an Inflammation, with an Impoſthume following of it in the Breaſts. This Feaver, whilſt the Lochia are in good order, hardly laſts three days, but that about that ſpace it is wont to be allayed, a plentiful ſweating ariſing of its own accord; yet this intemperature being excited by the coming of the Milk, is ſomewhat increaſed and continued longer, if that the Milk entring the Breaſts in abundance, be not milked forth, but is again repelled from thence; for by its departure, as well as by its coming, a perturbation is wont to happen in the whole Body, with thirſt and heat, which alſo more certainly comes to paſs if it happens to be driven away violently, by repelling Topicks. But being driven by their help from the Breaſts, or departing of its own accord, it is thruſt forth, with the Lochia, in the form of a whitiſh humor, and a ſweat, or more plentiful tranſpiration, exterminates the Reliques of the Diſeaſe. If that with this kind of intemperance, brought in by reaſon of the commotion of the Milk, the Lochia be ſtopped, or errors in eating and drinking be committed, or any other evident cauſe ſhould happen, that may increaſe the fervor of the Blood, very often the Milky Feaver, preſently acquiring worſe Symptoms, changes into a Putrid or rather malignant Feaver.

The Cauſe, or formal Reaſon of the aforeſaid Feaver (whilſt the way of the Milk lies hid) may be only propos'd, from an Hypotheſis, and as it were a certain Augury; for being ſuppoſed, that this milky humor is carried to the Breaſts immediately, by a peculiar paſſage, from the Viſcera of concoction, without any commerce with the Blood, this feaveriſh Diſtemper ariſes, for that the Breaſts being filled with Milk, and greatly diſtended, the ſanguineous Veſſels are ſo compreſſed, that they do not eaſily tranſmit the Blood flowing thither; from whence, the Blood being hindred in its circuit, begins to tumultuate through its whole maſs, and the Spirits being inordinately moved, and wholly confuſed, it conceives a fervor, ſuch as being induced by a Stopping, Surfeit, Inflammation, or Wound, conſtitutes ordinarily the ſimple Synochus; but if the matter of the Milk (as it is not improbable) paſſes through the Blood, this Feaver of Women in Child-bed, ſeems to ſpring from hence,

that

that when this Latex is transferred to the Breasts, having left the Womb, a great portion of it subsists in the mass of Blood, which indeed, for that it exceeds the provision of the nourishing juice, and so cannot be wholly assimilated, and besides abounds in heterogeneous parts, and as it were something extraneous, and not mingleable with the Blood, creates a trouble, therefore for the carrying it forth of doors, and putting it forth, this three days feaverish Distemper is employed; For when the milky Chile, being used to be separated about the Womb, by and by, after being Delivered of a Child, that wax of excretion is hindred, restagnating into the mass of Blood, it is there first of all heaped up more plentifully, than that the whole may go into nourishment, or be received into the Breasts: wherefore, the Milk, not only in its passage to the Breasts, but also in its return towards the Womb, brings forth the Feaver, to wit, by reason of either passage thorow the Blood.

But however the cause of this Disease is ordained, it matters little or nothing towards the Cure; for this is wholly committed to nature, and so long as the Lochia are in good order, it proceeds for the most part happily, without any Phylical help, because after the growing hot of the Blood, for three or four days, either a plentiful sweat, or a more free transpiration, cures this Distemper, to wit, either the Particles of the Milky humor, degenerate in the assimulating, or the adust recrements, remaining after the deflagration of the Blood, or both of them at once supplying the food or tinder of the Feaver, are by little and little subdued, and evaporated out of doors, which being excluded, the Blood becoming free from the extraneous mixture, quickly recovers its pristine condition; yet in the mean time, certain vulgar Rules are wont to be observed, about the admission of the Milk into, or the driving away of the same, out of the Breasts. If the Milk too plentifully springs into the Breasts, that their inflammation, as also the immoderate growing hot of the Blood, may be prevented, at that time, a more thin and sparing dyet, to wit, no flesh broths, and also in a less quantity, is to be ordered: also the Breasts are to be frequently drawn. If it be not commodious for the Mother to suckle her Child, it is usual after the first or third day of her being Delivered to cover all the Breasts over with Sear-Cloaths moderately binding (as the Plaister of Red-lead, &c.) for so the spongious substance of the Glandula's, is somewhat constrained, or closed together, whereby they less readily receive the milky humor flowing thither, yet this kind of Remedy ought to be cautiously adminiſtred, lest if the Milk be wholly excluded, or driven out of the Breast too abruptly, restagnating suddenly in the Blood, it induces its disorder, the prodromus or forerunner of the Putrid or Malignant Feaver: of which it remains that we speak next.

The Putrid Feaver of VVomen in Child-bed.

VVOmen Lying in, from the fault of an evil affected Body, as by the Contagion of a received Pestilential Air, are found to bee too obnoxious to the Putrid, or rather Malignant Feaver; but all do not alike receive the Infection of this sort of Disease; for poor people, Labouring Women, Country Women, and others accustomed to hard Labour, as also Viragoes, and Whores, which are brought to Bed clandestinely, bring forth without any great difficulty, and then, after a little time, leaving their Beds, return to their wonted Labours. But more rich Women, tender and fair, and most living a sedentary life, as if participating after a more grievous manner of the Divine Malediction, bring forth in pain, and then presently after the Birth they are subject to difficult and dangerous chances; the reason of which seems to lie in this, that those who are used to much exercise, continually agitate and eventilate the Blood, and therefore fewer infectious taints from the monthly Flowers being suppressed, do gather together for the matter of a Disease; moreover, laborious and nimble Women, as they have their nervous parts more firm, therefore they are less subjected to convulsive motion, and to the passions commonly called hysterical; on the contrary, in delicate, and idle Women, the mass of Blood, in the time of their going with Child, becomes very impure and fermentisible; besides, because they have the system of the Nerves, and the Brain soft and weak, upon every light occasion, they suffer distractions of the animal Spirits, and inordinate motions of the nervous parts And here, by the way, it is to be noted, that Women more than men, and that some of the same Sex before others, are sensible of the affections called hysterical, not so much by the default of their Womb, as for that they are of more weak constitution of Brain, and nervous stock; for in those so affected, the passions of anger, sadness, fear, as also all troublesome and more strong objects, easily pervert the dispositions and functions of those parts, which when they are once hurt, for the most part afterwards, are accustomed to those irregularities. But we will return from whence we have digressed. The Feaver but now proposed, is wont to infest Women Lying in, indeed

at various times, and by reaſon of diverſe occaſions, now preſently after the Birth, eſpecially if it be difficult and laborious, now it ariſes in the firſt, now the ſecond, third, or fourth week; yet the ſooner it begins, the more ſafely it is wont to be cured. The Type or Figure of this Diſeaſe, is performed almoſt after this manner. After a previous indiſpoſition, an open feaveriſhneſs, for the moſt part with a ſhivering, or horror, conſtitutes the firſt aſſault, which is followed with heat, and afterwards ſucceeds a ſweat: perhaps, for a day or two, they have various reciprocal fits of heat and cold; then the Blood being wholly inkindled, the Lochia, if not before ſuppreſſed, either flow ſmally, or are wholly ſtopt: If the Diſeaſe be acute, and of a ſwift motion, it comes to its height on the third or fourth day, then an intenſe heat, with a very troubleſome thirſt, a vehement pulſe, and quick pertinacious wakings, a great inquietude of the whole Body, that they are continually toſſing themſelves in their Beds hither and thither, a thick Urine, and high coloured, and other moſt grievous ſymptoms, are wont to trouble them: whilſt the Feaver is after this manner at its height, no Criſis is to be expected; for I never ſaw this Diſeaſe cured by a critical ſweat, but that the buſineſs was ſtill very precipitouſly acted, as after the Blood was grown hot for a little time, preſently the aduſt matter being tranſlated to the Brain, moſt dangerous and heavy inordinations of it, and the whole nervous ſtock forthwith come upon them; for moſt often are ſtirred up, convulſive motions of the Tendons, wonderful diſtentions, and inflamations about the Viſcera, like to the hyſterical paſſions; then ſometimes, alſo follow a phrenſie, or delirium, not ſeldom a ſtupefaction, and ſpeechleſneſs; the ſtrength is ſuddenly caſt down almoſt in all, without any manifeſt cauſe, the Pulſe becomes weak, and unequal; and the ſick are ſuddenly precipitated to death; If that any perhaps eſcape, either by the returne of the Flux of the Lochia, or a Lask, coming upon it, they hardly recover but of a long time: I have known in ſome, purple ſpots to have appeared, and certainly in many, ſymptoms that reſpect either the Blood or nervous juice, which argue no light Malignity.

We will diſtinguiſh the cauſes of this Feaver, after the ordinary manner, into Procatartic, Evident and Conjunct. Thoſe of the firſt ſort, upon which the malignity, and the greateſt perniciouſneſs of the Diſeaſe depend, are two, *viz.* firſt, a depraved diſpoſition of the Blood, from the long ſuppreſſion of the monthly Flux. Secondly, after the Birth, the evil affections of the Womb, from the dangerous Labours of Women, (who undergo the Divine Malediction appointed them) from the Menſtrua being long ſuppreſſed, the Blood not only ſwells up, and its Sulphureous parts being too much carried forth, are rendered more apt for burning, but beſides, the maſs of the Blood is imbued with very fermentative Particles, ſo that (as hath been already hinted) as if it were touched with a venomous infection, preſently growing fervent, it is diſpoſed towards putrefaction, and corruptive diſorders; and beſides, forthwith impoyſons the nervous Liquor, and renders it infeſtuous to the Brain and the whole nervous ſtock. Theſe kind of evils, being impreſſed on the Blood, ought to be purged forth, by the Flux of the Lochia; but if after the Birth, the Womb be out of order, the Lochia are not only ſtopped, and ſo a purifying of all the Blood is hindred, but beſides, ſtinking corruptions or defilements, are thence beſtowed on the Blood, and grievouſly infect it: Alſo, by reaſon of convulſive motions, begun about the Womb, and from thence continued to other parts, inordinations are ſtirred up in the Blood and juices, which oftentimes conſpire, either the production, or the acerbation or growing worſe, of the Feaver.

The evident cauſes, which induce an actual effervescency, either to the Blood, having gotten an ill diſpoſition, or invert the vices of the whole Body to the Womb, are after a diverſe ſort. A painful Labour, a ſolution of the unity about the Womb, a bruiſe, a retention of preternatural things, an ulcerous diſpoſition, and very many other accidents, which are induced by a certain neceſſity, may do this. But the occaſions, that are at the diſpoſe of the Patients, and eaſily to be avoided, which are wont to excite this kind of Feaver, are chiefly two, *viz.* an ill manner of Dyet, and the taking of cold. It is an uſual thing, to give to weak Women, after being Delivered, on the firſt or ſecond day, the fleſh of living Creatures, or Broths made of fleſh meats, and other foods, very improportionate to their diſpoſitions, from whence preſently ariſe an indigeſtion, and great trouble in the Bowels, and a feaveriſh diſtemper in the Blood by reaſon of a more rich nutritious juice than ought to be. Beſides, the errors in Dyet, oftentimes hurt is cauſed, for that their Bodies, being ſo very tender, alſo by reaſon of the labours of the Birth, and bringing forth the Child, the paſſages are on every ſide opened, they are expoſed too heedleſsly to the cold: for moſt of them, being impatient of their Bed, within a day or two, or ſooner than they ſhould do, riſe out of it, and put on their Cloaths, from whence, preſently the Pores of the skin being ſuddenly contracted, and the Air being admitted into the parts of the Womb, tranſpiration is hindred, and often the Lochia, on the ſudden are ſtopped, either of which ſuffices to excite the feaveriſh diſtemper.

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The conjunct cauſe, or formal reaſon of this kind of ſickneſs, chiefly comprehends theſe three things, to wit, there are preſent, firſt, a very notable diſcraſie of the Blood, that growing hot, from the Feaver being occaſionally induced, it doth not equally burn forth, nor leiſurely overcome the aduſt recrements, and afterwards critically thruſt them forth; but the Blood growing hot, is preſently looſned in its mixture, and its frame being unlocked, turns and declines towards corruption; hence, when it grows but a little cool, the ſpirits being ſhaken out of thier dominion, are moved into confuſion. In the mean time, the Sulphureous Particles become untamed, and fierce, wherefore, the ſtrength falls down without any maniſeſt cauſe, the Pulſe is made weak and diſordered; after the deflagration of the Blood, altho the aduſt recrements are very much heaped up, yet nothing is rightly concocted or ſeparated, but the ſick being greatly oppreſſed in Nature, tho they continually ſweat, receive nevertheleſs oftentimes no eaſe from thence; but the feaveriſh matter, which ought to be thruſt forth, being tranſmitted into the head, and nervous ſtock, induces there moſt grievous perturbations of the animal regiment. Secondly, the Tragedy of this Diſeaſe owes no ſmall part of it, to the nervous juice being preſently made ſharp, and ſo improportionate to the Brain, and its Appendix; for this being infected, from the taint contracted from the Blood, doth not gently water, or pleaſantly blow up its ſubjects, but notably hale or pull thoſe tender parts, (as when an infuſion of vitriol is poured upon a Worm) and irritates or provokes them into convulſions, and into motions, as if of dancing or ſuddenly leaping forth, and ſometimes wholly overturns their functions; hence comes contractures, grievous convulſions, delirium, wakings, and ſometimes ſtupification, and the ſleepy Diſeaſe, upon Women Lying in. Thirdly, whilſt theſe things are done, oftentimes a third band of ſymptoms infeſt the ſick, to wit, for that the Womb, being hurt by ſome evil, moves it ſelf diſorderly, and is ſtruck with a Convulſion, according to theſe or thoſe parts, from thence by and by, convulſive motions invade, by the membranes, and nervous paſſages, the whole Region of the Abdomen; wherefore, the Viſcera and Hypocondria are blown up, belchings, and grievous vomitings are ſtirred up, then the Diſtemper creeping upwards, and poſſeſſing the nervous parts of the Thorax, a difficult breathing, and unequal, a palpitation of the heart, a ſenſe of choaking in the throat, by reaſon of the Muſcles being there drawn backward, and other ſymptoms, through the whole Body are excited, the ſame evil being at laſt carried to the Brain.

The Feavers of Women in Child-bed almoſt never want danger; but ſometimes it happens, about the beginning, that they are cured by a ſlender Dyet, and by the Flux of the Lochia being reſtored; but if the feaveriſh diſtemper does root it ſelf more deeply, that the whole Blood is inkindled, and immoderately grows hot, the Prognoſtick ought not to be eſteemed of a light Omen; and there will be a greater reaſon of danger, if beſides the heat being ſuffuſed all over, the ſick are troubled with a frequent ſhivering, if they are affected or moleſted with a great diſquietneſs, and wakings, with ſudden concuſſions of the Body, or a contracture of the Tendons: or if, Thirdly, they complain on the fourth days of a tingling of their ears, with a great repletion or fulneſs of the head, you may from thence collect the evil to grow worſe, *viz.* a tranſlation of the feaveriſh and hurtful matter to the Brain; nor is it leſs to be feared, if they have on them an oppreſſion, and weight of the *Præcordia*, that the ſick cannot breath freely, nor draw their breath deep, and from the bottom of their breaſt, but only from the top, and that frequently, and ſighingly, and that they move themſelves reſtleſly hither and thither: For this argues the Blood to ſtagnate in its circulation, about the Heart and Lungs, and alſo to be apt to grow into clodders, and to be coagulated, that if yet worſe diſtempers of the Brain and nervous ſtock follow, and the Pulſe ſhould become weak and unequal, you may pronounce the buſineſs almoſt deplorable; but if (as ſometimes tho it more rarely happens) after the Feaver being inkindled, and grievouſly threatning, either the Flux of the Lochia returns, or a Diarrhea with eaſe ſucceeds, ſome hope of health may be admitted, tho the ſame be at the laſt caſt.

Concerning the Cure of theſe kind of Feavers, there lies a very great task upon the Phyſitian, becauſe any Phyſick is eſteemed with the vulgar not only unprofitable, but alſo hurtful for Women in Child-bed; wherefore, Phyſicians are rarely ſent for, unleſs when there is no place left for remedies, and the opportunity of all profitable means be wholly paſt: If that perchance they ſhould be preſent, about the beginning of the Diſeaſe, it will not be eaſie to procure health to the ſick by vulgar Remedies, but whatever they ſhould attempt, unleſs it ſhould bring help, it would be ſaid by the Women, and others about the perſon, to be deadly and the only cauſe of her death; that in truth there is wont to happen to us, leſs of profit, or more of ignominy, about the Cure of no other Diſeaſe, as in this.

But the method of curing (even as in Contagious Diſeaſes) ought to be inſtituted twofold; to wit, Prophylactic or Preventive, and Therapeutic or Curative: The former of theſe

theſe, delivers Precepts and Cautions, whereby Women lying, may be preſerved from the aſſault of Feavers: the other ſuggeſts curative intentions, whereby the ſick (if it may be done) may at length recover health.

1. Although this Feaver be ſomewhat Malignant, it is not caught by Contagion, and there is no fear of the ſicks receiving outwardly any invenomed taint; notwithſtanding, all Women in Child-bed have an innate mine of virulency, and from the evil of this, as it were the tinder of moſt high Malignity, they ought to beware; wherefore, they need an exact ordering, to wit, whereby after the Birth, the impurities of the Blood and Humors may be rightly purged forth, without danger of a Feaver; alſo, that the evil affections of the Womb may be healed, and that the ſtrength being broken and debilitated by the Labour, may be reſtored after its due manner. For theſe ends, theſe three things are chiefly to be inculcated, for preſcripts by Phyſicians.

Firſt, I judge it neceſſary, that a moſt exact manner of Diet be commanded to Women in Child-bed; to wit, that they be wholly fed with Oatmeal-Cawdle, made ſometimes of Beer, and ſometimes of Water and White-Wine mixt together, alſo with Panada, and other light Nouriſhers, for a week at leaſt; becauſe they are much emptied, therefore it may be lawful for them to ſup often, but nothing of ſolid or more ſtrong food is to be given. For I have diligently obſerved that theſe Feavers have been oftenеſt induced by the eating too ſoon Fleſh, or ſtrong Broths, or Food. Foraſmuch as Women lying in, ought to be handled, not only as thoſe that are grievouſly wounded, but as thoſe that have got a Feaveriſh indiſpoſition, from a diſturbed diſpoſition and temper of the Blood: For with them, the Blood being already too much carried forth, and as it were touched with an impure infection, moſt quickly catches Flame, by the acceſs or means of any Sulphureous thing.

Secondly, After Diet, the care will be, leſt the Pores be ſhut up, by the incautiouſly taking cold from without, or that the Lochia be ſtopped: for upon the leaſt occaſion, the manner of tranſpiration being changed, the Blood firſt growing hot, conceives diſorders; alſo the Womb being touched by the blaſt of Air, contracts it ſelf, and ſhuts up the mouths of the Veſſels, whereby the Lochia flow forth leſs: wherefore, for five days at leaſt, after being delivered, I would have Women wholly to keep their Beds. I know that it is a common cuſtom to raiſe them from Bed on the third day, but by that means I have known many that have fallen into Feavers; and in truth, if we deſire to keep Women in Child-bed from all danger, the ſafeſt means will be, that they may be kept long in their Beds.

Thirdly, Concerning Preſervation, the intent remains, that by cauſing a gentle provocation of the Blood in Women Lying in, the Flux of the Lochia may be continued; for this end, Midwives are wont (if after a difficult Labour they fear that Evil) to give them *Sperma Ceti*, or Powder of *Iriſh* Slate, or Saffron ſteep'd in White-Wine; moreover, to make them Oatmeal-Cawdle, that may more fuſe the Blood, of Water, and White or Rheniſh Wine mixed together, in which they boil, or in Poſſet-drink alſo, Marigold-flowers, Leaves of Peny royal, or Mugwort; there are many other kinds of Adminiſtrations extant, about the ordering of Women in Child-bed, which being commonly known, I willingly paſs over here.

The Cure of the ſubſequent Feaver of Women in Child-bed, is far from the uſual method in Putrid Feavers: for in this, it is not to be expected, that the Blood being touched with a Feaveriſh burning, ſhould by degrees burn forth, and the ſame ſhould be ſeparated by a Criſis, but rather (as it is done in a Malignant Feaver) aſſoon as the Blood grows immoderately hot, it is convenient for it to be moved by gentle Diaphoretick Remedies, and its heterogeneous and impure mixtures to be carried forth of doors; wherefore, among the common people it is a cuſtom (and that not bad) to give to Feaveriſh Women Lying in, Sudorificks preſently; by this means, the Blood being eventilated, its effervency is allayed; alſo, by reaſon of its agitation, the Lochia apt to be reſtrained, are provoked into a Flux. There is great difference among Authors, from whence the beginnings of theſe kind of Feavers ought to be computed, *viz.* whether from the Birth it ſelf, or from the firſt ſenſe of growing Feaveriſh? However it matters little whether it be after this or that manner: For ſince this Feaver runs not the uſual ſtadia or courſes of the Putrid, neither hath a Criſis, nor wholly admits the uſe of Cathartic or purging Remedies, we need not be ſolicitous ſo much for the days, concerning its period and menſuration. But yet, as to the Curative Indications, it will be of uſe only to diſtinguiſh what is to be done in the beginning, increaſe, and end of this Diſeaſe: alſo, what we ought to endeavour whilſt there is ſome ſtrength remaining, as alſo what, when 'tis oppreſſed, and very much dejected.

When therefore any Woman in Child-bed is firſt taken with this Feaver, (whoſe aſſault is known from the Milky Feaver, becauſe for the moſt part it begins with a ſhivering) you muſt preſently let it be your work, that the more plentiful ſuſtenance may be drawn away from the burning Blood, and as I have already admoniſhed, that the fleſh of living Creatures, and

Broths

Broths made of them, be utterly forbidden; yet in the mean time, all cold things, and that are indued with a ſtiptic or binding virtue, are equally to be avoided; for theſe fix the Blood, and bind it too much, and hinder its very requiſite Purgation, both by the Lochia, and by tranſpiration through the skin. But rather, though the Feaver be urgent, give them Decoctions, Powders, and Confections of things moderately hot, of which ſort are (as is already ſaid) Decoctions, or diſtilled Waters of the Flowers of Marigolds, the Leaves of Penyroyal, Mugwort, the Roots of Scorzonera, alſo Bezoartic Powders, Spirits of Harts-horn, fixed Salts of Herbs, *&c.* If the Lochia ſhould be ſtopt, that their Flux may be again provoked, muſt be endeavoured every way: To the moving of this, conduce Frictions and Ligatures about the Thighs and Legs, ſometimes Cupping-Glaſſes, or Bliſters about the Thighs or Hips, alſo in the Soles of the Feet; alſo, ſometimes the opening of a Vein in the Ankle, is convenient; in the mean time, a Fomentation of the Hyſterical Decoction, is to be applied about the Pubis, or the Caul of a Weather or Sheep taken out warm, may be laid to the bottom of the Belly; and experience manifeſts, that ſometimes Injections into the Womb are profitable: If the Belly yields not, it may be gently brought down, with a Violet Suppoſitory, ſo called, or an emollient Clyſter; of more ſtrong provocations you muſt take heed, becauſe in Women Lying in, even as in a malignant Feaver, from a copious dejection, with loſs of Spirits, Life is quickly loſt. If withthe ſuppreſſion of the Lochia, there be a notable perturbation of the Blood, with Vomiting, thirſt, and wakings, I have often known Laudanum mixt with Saffron, given with happy ſucceſs. Inſtead of a cooling Julep, this kind of mixture is convenient, *viz.* Take of Water of Penyroyal and Balm, each three ounces, of Hyſterical Water two ounces, of the Syrup of Mugwort three ounces and an half, of the tincture of Saffron two drams, of Caſtor ty'd in a Rag, and hung in the Glaſs, one ſcruple, mingle theſe, and let them drink of this three or four Spoonfuls oftentimes in a day.

2. If notwithſtanding the uſe of theſe Remedies the Feaver grows worſe and worſe, and by degrees is increaſed with worſer Symptoms, that beſides the diſorders of the Blood, the Brain and nervous parts begin to be touched, Medecines, though many of every kind may be tried, do little; yea, in this caſe the indications are almoſt the ſame with thoſe made uſe of in the Plague it ſelf: foraſmuch as the Lochia being for a good while ſuppreſſed, they cannot eaſily be reduc'd, or ſcarcely at all, in the great confuſion of the Blood and Humors, therefore it is convenient quickly to move a Sweating, to wit, that the corruptions impreſſed on the Blood and nervous Juice, and reſtagnating from the Womb, may be carried forth ſome how, by ſweat and inſenſible tranſpiration. Therefore here, Powders, and Confections of Bezoar, Spirit of Harts-horn, or of Soot, Tinctures of Corals or Pearls help. I have ſometimes ſeen, by the help of theſe kind of Medecines, in a deſperate caſe, when the Pulſe, and other ſymptoms have appeared a little better, ſome ſmall hopes to ſhew themſelves; yet Cure rarely to follow: but when the uſe of theſe Cordials were left off, the ſick with a weak pulſe, and a Looſneſs preſently ariſing, have been precipitated to Death.

3. When yet the buſineſs of the ſick proves ſtill worſe, when the Feaver being increaſed, the pulſe is weak and unequal, and frequent horrors, and convulſive motions in the whole body, with a delirium and ſtupefaction infeſt them, then the Phyſician having firſt made a prognoſtication of Death, may inſiſt upon a few Remedies, and thoſe only Cordials, and muſt wholly abſtain from Blood-letting, Scarification, Bliſtering, or the uſe of Cupping-glaſſes; for ſuch adminiſtrations beget only an odium or blame, that by ſo doing, we are eſteemed by ſome Women, as wicked and cruel.

The Symptomatic Feavers of women in Child-bed.

THE Acute Diſeaſes of Women in Child-bed, ſhew themſelves not only according to the Figure of the aforeſaid Feaver, but ſometimes they are beſet with ſome ſignal ſymptoms, to wit, the Squinancy, Plurilie, Inflammation of the Lungs, Dyſentery, Small Pox, or of ſome other kind; and at that time, they get the appellations of thoſe Diſtempers. It will not be here ſeaſonable to repeat at large what belongs to the Eſſences and Natures of each; but I ſhall briefly ſhew what theſe ſickneſſes, being complicated with the Diſtempers of Women lying in, contain peculiarly, as to the Cauſes or Cures.

All theſe Symptoms, we ſuppoſe to proceed from a certain coagulation of the Blood, and from thence its extravaſation; But whilſt the Blood is extravaſated, or put forth of the Veſſels in one part, its efflux, however natural and critical, is hindred in another: wherefore it is dangerous, leſt whilſt the Blood begins to be coagulated, either in a particular or accuſtomed neſt of Coagulation, or univerſally in its whole maſs, the flowing of the Lochia be ſtopped, which

which in truth for the moſt part happens, and therefore theſe Diſtempers, for the moſt part, are deadly to Women in Child-bed; yet the Cauſe of their Death, for the moſt part, happens with ſome difference, *viz.* in the Small-pox, the flowing of the Lochia draws inwardly the malignity, begun to be carried forth outwardly, and forthwith compells the maſs of Blood, and the Heart it ſelf to be empoyſoned with its evil; and therefore in the Small-pox, theſe purgings of the womb are convenient to be ſtopped; but in the Pleuriſie, Squinancy, and the reſt, when the provocative of the Diſeaſe being fixed here or there, in a particular place, draws to it ſelf the impurities of the Blood, which ought to be ſeparated or ſifted forth by the Lochia, and derives it ſtreight from the Womb, for that reaſon it increaſes the impurity of the Blood. The Lochia being ſtopped in the Small pox, by the more univerſal manner or way of excretion, may be ſhut forth of doors, with the venomous particles of the Diſeaſe, which thing indeed does not ſucceed in the reſt, by reaſon of the minute, and more ſparing manner of excretion.

Of theſe, the Squinancy, Pleuriſie, and Inflammation of the Lungs, by reaſon, both of the great ſimilitude of the Cauſe, and analogy of the Cure, may be conſidered together; when any Woman lying in is diſtempered with any of theſe, it is to be ſuppoſed, that beſides the infection gathered together in the time of being Big-bellied, there happens a certain ſowriſh diſpoſition of the Blood, by the means of which, whilſt that it ſelf grows feaveriſhly hot, certain Particles of it, being fuſed with the Sowrneſs, enter into congelation, in this or that part, like Milk growing ſowr, and then to be coagulated: The Blood being there frozen or congealed, and hindred in its circuit, ſtops the paſſage of the reſt; but the Blood being obſtructed in its motion, buts againſt the impediment, and ſo being heaped up about it, and driven forth of the Veſſels, grows into a tumor: from thence preſently, whatſoever is contained in its maſs, that is heterogeneous, and to be ſifted forth, is laid aſide into the diſtempered part, as it were a ſink: wherefore, the corruptions of the Blood, that ought to be purged forth by the Womb, are derived from thence towards the neſt of this Diſeaſe, which, when they cannot be ſufficiently purged forth by this way, both more remarkably corrupt the Liquor of the Blood, and render the particular diſtemper, *viz.* the Squinancy, Pleuriſie, or any other more hard to be cured.

For the Cure of theſe kind of complicated Diſtempers, preſently from the very beginning, it ſhould be endeavoured, that the Blood being fixed ſomewhere, and begun to be extravaſated, may be reſtored to Circulation, that it may not impoſtumate; becauſe, very rarely, Women lying in, are cured of theſe Symptomatic Feavers, by an Impoſthume, or ſpitting forth of the corrupt Matter: wherefore, internal Remedies, which fuſe the Blood, and free it from coagulation, are to be made uſe of; of which ſort are chiefly Diaphoretics full of volatile Salt, as Spirit of Hart-horn, Soot, Urine, alſo the Salts themſelves; in like manner, Shelly and Bezoartic Powders, Lapis Prunellæ, Decoctions and Juleps of Vegetables provoking Urine, or the terms, with all which ought to be mixed, what by experience are found proper for the diſtempers of the Womb: Beſides, diſcuſſing Remedies, which may drive away the impacted matter, and diſperſe it (of which ſort are Liniments, Fomentations, and Cataplaſms) are diligently to be applied. In the mean time, the more impetuous motion, and immoderate effervency of the Blood, are to be removed, and its purgings, by all the wayes poſſible transferred to the inferior parts. For this end Frictions, Ligatures, Epiſpaſtics, and (if need be) Scarifying about the Feet and Legs, are to be adminiſtred; if the diſtemper very much growing worſe, a taking away of Blood be indicated, unleſs there be a great fulneſs in the whole Body, and a very acute inflammation in the diſtempered part; it will be beſt to open a Vein in the Foot, or to take away Blood from the hemorrhoid Veins by Leeches: But if neceſſity urges, it may be done in the Arm it ſelf, if after that Letting Blood (if another be admitted) let it be done in the Leg; but you are to be warned, that in theſe caſes, the opening a Vein is to be ordered very cautiouſly, for unleſs it brings preſent help, (which I have rarely known it to do) immediately the Pulſe being made more weak, the buſineſs of the ſick becomes much worſe.

The Dyſentery takes its riſe almoſt for the like cauſe, with the aforeſaid diſtempers; but in this, becauſe the extravaſated Blood is preſently poured forth, nor being retained in the Body becomes there troubleſome, or is any more corrupted, and as this Flux makes an excretion near the Womb, and does not afterwards drive it to any other place, there is leſs of danger to be feared, from this Diſeaſe, than from thoſe aforeſaid: yet oftentimes this Diſeaſe, is fatal to Women in Child-bed, for that indeed, the rather, becauſe things attempering of the Blood, and moderately binding, are ordered for the Dyſentery: for theſe are found too apt to inhibit the Flux of the Lochia; wherefore in this caſe, until the Women Lying in are ſufficiently purged by a long Flux, the Cure of the other Diſeaſe is to be omitted, and the fiercenes of the ſymptoms is to be allayed, only with gentle aſſwaging things.

The indications of the Small Pox, do not only differ from thoſe above deſcribed, but indeed they

they are beſet with contraries to themſelves; for they require (as hath been ſaid) that the Flux of the Lochia ſhould be moderately ſtaid: yet in the mean time, that the flowring forth of the Blood, and a gentle ſweat ought to be continued; for when in this Diſeaſe, the invenomed ferment is twofold, and the corrupt Particles of the Blood, are carried outwardly in a twofold way, you muſt beware, leſt that the leſſer, and ſtraiter part, ſhould draw to its door, the whole matter, or more than it were able to ſend forth: therefore, leſt the Lochia flowing more plentifully, ſhould recall inwardly the venom, apt to flower outwardly, the manner or way of Dyet is ſomewhat to be changed, and eſpecially thoſe things which have a poyſon reſiſting force, and are alſo aſtringent (as the roots of Tormentil and Biſtort) are to be boyled in the Broths of the ſick; alſo Powders, Juleps, and Opiats, indued with ſuch like virtue, are convenient to be adminiſtred at due intervals, yea, in this caſe, by no means, Women ſhould be indulged, that they might eat fleſh, or Broth made of it, or to riſe out of their Bed: but the quiet, both of mind and Body, is to be procured, as much as may be, and a Dyet to be ordered of thoſe things, that move not the Blood, and the buſineſs almoſt wholly to be committed to God and Nature.

What hath already been ſaid, concerning the acute Diſeaſes of Women in Child-bed, may eaſily be illuſtrated with Hiſtories and Obſervations: But examples which may be brought in this thing, for the greateſt part, are mournful and of an ill chance: becauſe thoſe Feavers for the moſt part end in Death. But to deſcribe theſe kind of ſickneſſes, does neither confirm the work of the Phyſitian, nor render approved the method of Medicine, altogether taken in them; however, becauſe the knowledg of theſe may make for the better diſcovery of this Diſeaſe, I ſhall here propoſe ſome ſingular caſes of Women Lying in, and variety of ſymptoms; in which, altho the forms and means of Cure more ſparingly occur, yet we may have ſome rules of precaution, of no contemplable uſe.

A Gentlewoman in her ſix and twentieth year of her Age, brought forth her ſixth Child, with very difficult Labour, and not without danger of her Life; yet preſently after, ſhe began to be better; on the ſecond day ſhe eat a whole Chicken, on the third roſe out of her Bed, and ſate in a Chair for four hours; the night following ſhe found her ſelf ill, at which time her Milk came into her Breaſt; which, by the application of Diaculum Plaiſters, ſoon vaniſhed; the next morning ſhe complained of a wearineſs and as it were an ulcerous pain of her whole Body, alſo of a vomiting, nauſeouſneſs, and fulneſs about the Ventricle, and Hypocondria: the following night was full of trouble; on the fifth day ſhe was plainly in a Feaver, ſhe felt now a ſhivering, now a heat, every where increaſing, ſhe nauſeated every thing, and was troubled at her Stomach; moreover being unquiet, and without ſleep, the Lochia flowed little, but a whitiſh humor (commonly called the Flux of the Milk) came away: In the evening ſhe had a weight, and as it were a ſleepineſs about her forehead and temples, and began to ſleep a little; but awaking in half an hour, being diſturbed with Phantaſms, ſhe complained of her head, as if increaſed in bulk, alſo of her jaws being ſet, that ſhe could not open her teeth, and her fiſts being ſtrongly clutched, ſhe ſeemed as if ſhe felt a pricking and ſtupor, or numneſs in her whole Body; her Ventricle and Hypochondria ſtood ſtill inflated, and ſtretched forth; they adminiſtred to her Frictions, Ligatures, Cupping-glaſſes, and other Remedies, both inward and outward, that might recall the Lochia, and drive the recrements of the Blood from the head: Her Pulſe being weak, and diſordered, would not admit of Letting Blood; Powders, and Juleps, which might gently move ſweating, and fuſe the Blood and nervous juice, and hinder them from reſtagnating, were diligently given her; yea, fomentations, now of Woollen Cloaths dipped in emollient Decoctions, and now of warm inwards of living Creatures, were applied to her Belly; in the mean time, ſtinking things (ſuch as they uſe to the Mother Fits) were put to her noſe, which might drive away the impetuouſneſs of the Spirits and Blood, carried into the head, but theſe, and other things, being for ſeveral hours carefully performed, ſhe ſeem'd to feel ſome eaſe; but ſtill ſhe feared to ſhut her eyes, or to ſettle her ſelf to ſleep, for her eye lids being cloſed, a thouſand Phantaſms ran in her mind, with noiſe and tingling in her whole head: ſhe continued that night almoſt without ſleep; aſſoon as ſhe had begun to ſleep, preſently being affrighted, and feeling a weight in her Precordia, ſhe was awaked: on the ſixth day about noon, ſhe was troubled with a great ſhivering, or rather a horror, with a ſtrong concuſſion of the whole Body; to which, as in the fit of an Ague, by and by heat, and then ſweat copiouſly followed: but from thence, nothing of eaſe accrued to the ſick, for preſently after the ſweat, the feaveriſh heat was renewed, and convulſive diſtempers infeſted her more: the night following, with the reſt of the ſymptoms growing worſe, firſt a Palſie was excited in her tongue, and by and by in her throat, that ſhe could not ſpeak, and ſcarce ſwallow at all: on the ſeventh day, about the ſame hour, a ſhivering invaded her again, with heat and ſweat; then her Pulſe being much weaker, and unequal; alſo a difficult breathing, and fetching the breath ſhort and quick, with her Breaſt lifted up, ſhe knew not them about her: on the eighth day ſhe died.

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There was a manifold occaſion of the death of this Gentlewoman, prediſpoſed to a Feaver, by reaſon of her Big-belly, and which had increaſed the malignity of the Diſeaſe over and above; for the hurt received by her hard Labour, the ſudden excluſion of the Milk from her Breaſts, the eating of fleſh, and the riſing too ſoon out of her bed, hapning together made, as it were a conſpiration for the greater evil: The Blood being touched with a feaveriſh burning, preſently conceived inordinations, and ſnatched into it ſelf the Lochia, and perhaps other defilements of the Womb, and ſo by that means acquired a greater infection, and plainly venomous diſpoſition; the membranes of the Viſcera, being imbrued with the degenerate nervous juice, were ſtruck either with Convulſive motions, or with Convulſions continued to them from the Womb; for theſe kind of inflations, about the Abdomen, and thoſe diſtentions are the effects of Convulſions: For altho the direct Fibres drawing the member, do oftentimes preſs it, yet ſince the Fibres are direct and tranſverſe, and others placed in a various ſite, the membranes are pulled together into an hollowneſs, by their coming together, the part ſwells up like a blown bladder, into whoſe vacuity the Air being rarefied ſecondarily carries it ſelf forward: But it is not the Air (as is commonly ſaid) or a blaſt there at firſt heaped up, that is the cauſe of the diſtention. The Blood growing hot in our ſick perſon, and being quickly filled with an aduſt and malignant matter, did endeavour to ſubdue it, and being unable to put it forth by ſweat, forthwith fixed it in the Brain; the firſt ſuffuſion of the ſame matter into the head, by reaſon of the animal Spirits being half overthrown, brought in that ſenſe of her head being much increaſed in bulk; which thing happened by the like means as when the foot being taken with a ſleepineſs, ſeems as if it felt much bigger then it is: But that after ſome eaſe, the diſtemper grew worſe, by ſleep and cloſing of her eyes, the reaſon is, becauſe waking, and the exerciſe of the ſenſes, ſhake off and remove from them, ſomewhat, the matter beſieging the Brain and Nerves; which notwithſtanding being neer and in its precincts, ſleep creeeping on, is as it were ſupped up by them, and enters their Bodies more deeply with the alible juice. But the Blood, altho it had plentifully poured forth its recrements in the Brain, yet did not it ſelf become free; but being ſtill full, with an impure ballaſt, it conceived as it were a critical flowring, and attempted to ſhake off its burthen once or twice (as it is wont in a great excretion) with a ſhivering and with heat and ſweat following it, by which endeavour however nothing was further effected, than that the matter ſticking to the Brain, pierced more deeply into it, and becoming fixed in ſome little ſhoots of the Nerves, took away her ſpeech and ſwallowing, and afterwards her ſenſes; and the maſs of Blood, being by degrees more and more depraved, at length became unable to ſuſtain Life.

A NobleGentlewoman, being married a little before ſhe was twenty years of Age, and being with Child, uſed, during the time, an ill dyet, and little or no exerciſe; yet falling into Labour, and ſuffering the torments with intermiſſion, and frequent eaſe for twelve hours, at length was brought to Bed of a Son: The Child, with the afterbirth came away, and all things were right about the Womb: the firſt and the ſecond day ſhe found her ſelf indifferently well, but on the third, after a light ſhivering, ſhe began to complain of thirſt and heat; to which a looſneſs followed, that ſhe had that day four ſtools: the following night ſhe was almoſt without ſleep, the feaveriſh diſtemper remained, after that in the ſame manner for two days; daily ſhe purged three or four times; the Lochia as yet flowed moderately: when on the ſixth day, by the perſuaſion of the Women, ſhe had took ſome aſtringent thing, to moderate the Flux of her Belly, the purgings of the Womb were almoſt wholly ſtayed: at which time the Feaver became more ſtrong, and ſymptoms as it were hyſterical, appeared; for in her Precordia, ſhe had great and frequent oppreſſions, and was troubled with a ſenſe of choaking in her throat; on the ſeventh day, the heat was yet ſtronger, and her breathing difficult and laborious; but then, by the preſcription of a Phyſician, at that time firſt ſent for, Blood was taken from her foot to three ounces, by which ſhe was better for four hours; for a quiet ſleep, with a plentiful ſweat followed upon it, and the Lochia appeared again tho in ſmall quantity: In the Evening again, all things grew worſe, her ſtrength being very much loſt, her Pulſe weaker and unequal; ſhe complained alſo of a noiſe and tingling of her ears, with a fulneſs of her head, moreover a leaping up of the tendons in her wriſts; alſo ſhe had ſudden concuſſions of her whole Body, yet ſtill her looſneſs held; to her were adminiſtred, by the preſcripts of ſeveral Phyſicians, Cordials, and other Remedies, and kinds of Adminiſtrations carefully, but nothing profited, her Pulſe being more weak, and her ſtrength leiſurely waſting, ſhe died on the ninth day, after ſhe was delivered.

This Feaver very much depended upon the vitious proviſion of the Body, as the pocatartic cauſe; for I have often obſerved, that it fares ill with Women Lying in, who when Bigbellied devoured fruit, and any unwholſome traſh, and living without motion or exerciſe, indulged themſelves with eaſe and reſt: the Blood, by reaſon of the previous Cachexie, conceived a burning without any evident cauſe, as it were of its own accord: But growing hot laying

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ing inwardly ſtill its recrements, and impurities, cauſed the Diarrhea: neither yet was its maſs made more pure, by its almoſt continual excretion, yea rather being ſtill more depraved in its mixtion or craſis, the blood at length wholly departed from its proper diſpoſition, and became unable to be fermented in the heart, whereby heat and breath might be every where diſperſed: The looſneſs, excited by the motion of Nature, was untowardly ſtopped, eſpecially by the uſe of aſtringent things; for this I have often obſerved, never to be done without paying for it; becauſe the Flux of the Belly has cured ſome that have been ill, but in this Lady, and in many others (as has abundantly appeared to our Experience) altho it did not take away the Feaver, yet it freed her from the more grievous Diſtempers of the Brain and nervous ſtock: from whence this ſick perſon was wholly free from a Delirium, nor was ſtruck with Convulſive motions, till reduced almoſt to extremity.

The Mother of a Family, and a Gentlewoman about 36 years of Age or upwards, being with Child of her ſeventeenth Child, was troubled, and very anxious, leſt ſhe ſhould die of that Child-bearing: But (God favouring) ſhe was delivered well enough of a Son, and for three days after ſhe was very cheerful; on the fourth day, when ſhe had eaten more than ſhe ſhould do of a Chicken, a little before night ſhe fell into a feaveriſh Diſtemper, with vomiting and a ſtopping of the Lochia: all night ſhe lay reſtleſs and without ſleep, the next morning ſhe had four ſtools, and ſeemed ſomewhat eaſed: about Noon (about which time I came to her) ſhe complained again of heat and thirſt, as alſo a palpitation of the Heart, and of the aſcent of ſome ſubſtance in her throat; her Pulſe was quick and ſmall, her Urine red, the Lochia ſcarce appeared: I ordered her Juleps, Cordials, and things to purge the Womb, beſides a fomentation for the bottom of her Belly, alſo her Legs and Feet to be rubbed often, with warm woollen Cloaths; at going to ſleep I gave her of Laudanum one grain, with Saffron Powder half a ſcruple, in a ſpoonful of Treacle-Water: She ſlept well, and the Lochia came down plentifully, and by that means, with a ſlender Diet, and continuing to provoke moderately the Flux of the Womb for a few days, ſhe became very well.

The immoderate eating of Fleſh, as an evident and almoſt only ſufficient cauſe, without any great proviſion, or vicious prediſpoſition, induced the Feaver. The Lochia reſtagnating into the Blood, increaſed its intemperance, and preſently brought troubles upon the nervous kind; but in the mean time, the Blood altho growing hot, did not undergo any great corruption, but when the Recrements, heaped up by the Surfeit, were ſent forth by the Looſneſs, and the Blood, the Lochia being reſtored, began to be purged forth again after its wonted manner, this Feaver wanting a further malignant Ferment, quickly vaniſhed.

A Noble Lady, young and fair, was brought to Bed of a ſecond Child, and for ſix days, as to the Lochia and other Accidents, ſhe was well, and wholly free from the ſuſpition of any intemperature, ſhe ate fleſh daily, and riſing from her Bed, was brisk and chearful in her Chamber: on the ſeventh day, without any manifeſt cauſe, a ſhivering came upon her, with a Feaver, and a leſſening of the Lochia, but not ſuppreſſed: to the tenth day after her Delivery, ſhe was only moderately feaveriſh; whilſt the purgings of the Womb yet flowed, ſhe remained free from any grievous Symptom: but then, although ſhe was greatly feaveriſh, ſhe was more chearful than ordinary, and ſeemed more confident of her health: At Night ſhe ſlept little or nothing; the Morning following (at which time I firſt viſited her) ſhe clearly raved, the Lochia were ſtopped, alſo her whole Body was ſhaken with horror, the tendons of her Wriſts were pulled together, ſo that I could hardly diſtinguiſh her Pulſe, which in the mean time was weak, unequal, and very quick. I ſaid ſhe would die quickly, unleſs God ſhould miraculouſly reſtore her by his Divine Power; however, ſix grains of Oriental Bezoar being given her in a ſpoonful of Cordial Julep, brought upon her a plentiful Sweat, with a better Pulſe; then other Cordials being given, with due intervals, gave ſome little hopes, tho I doubted they would not continue: after four hours from the time that I came, the ſick Lady had of her own accord a great Stool, and preſently her ſtrength wholly failed her, and within half an hour ſhe died.

When there happened nothing of ill to this Lady, as to her Delivery, or Womb, ſo pernicious a Feaver, and ſo ſuddenly mortal, could not happen without a great and malignant procatarſis of the Blood and Humors; whether a more full Diet, or taking Cold, or any other evident cauſe, gave a beginning to this, is uncertain; becauſe, the Women and Nurſes helping her, knew of no manifeſt occaſion of her Sickneſs: The Feaver being inkindled, the infection of the Blood could not be wholly carried away, by the purging of the Womb, tho long continued; tho for that reaſon, the more cruel Symptoms came not preſently upon her, yet the Evil ſtill lurked within, and the Diſeaſe being very acute, ſhewing it ſelf with a ſwift motion on the fourth day, when Nature ſhould have endeavoured a Criſis, the matter of the Feaver being moved, but not overcome, as it were in a moment overturned at once, the Brain and nervous parts, whence Death was to be expected, and ſuddenly followed.

A Woman well known, who had ſcarce paſſed the twentieth Year of her Age, of a florid Countenance, and ſlender Body, after her being brought to Bed, when the Lochia flowed immoderately,

moderately, made uſe of ſome aſtringent Remedies, by the counſel of thoſe about her, by which means they were wholly ſtopped; but a Flux of her Belly ſucceeded, which when it had increaſed for three days, the Women gave her other things for the ſtopping her Looſneſs: nor were they fruſtrated in the ſucceſs; in the mean time, in the place of the former evil, they had brought a moſt dangerous Feaver, and diſtempers as it were hyſterical; for the unhappy Gentlewoman Lying in, was troubled with thirſt, heat, wakings, and at ſeveral turns, with ſwoonings, and cold ſweats; at this time being ſent for, I preſcribed her Cardaic Remedies, and ſuch as moved the purgings of the Womb, and alſo a Clyſter to be given her: at length, the Flux of her Belly being provoked, the Lochia alſo came down, and the ſick Woman being freed from the aforeſaid ſymptoms, and the more grievous Diſeaſe, to wit, the Remedies of the Nurſes, quickly grew well of her Feaver.

The more plentiful Flux of the Womb, hapning to this Woman, removed the Procatartic cauſe of a more grievous Diſeaſe: wherefore, when they had committed ſo many errors about the ordering her, (*viz.* firſt in ſtopping the Lochia, then what might compenſate their defect, in hindring the Flux of her Belly) yet the Feaver was only light, and without any venomous taint impreſſed on the Blood; the like to this I have known to happen frequently, to wit, when at firſt the purgings of the Womb have flown very plentifully, afterwards when they have flown very ſparingly, and ſometimes ſtopped, the Women in Child-bed have eſcaped. And by the way, it is here to be noted, that it is wholly dangerous, to inhibit, or at leaſt divert, and croſs any motion of Nature, incited, tho' irregular.

A Noble Gentlewoman, about Twenty Years of Age, indued with a ſmooth and full habit of Body, miſcarried twice in the ſpace of a Year; when ſhe had again Conceived, by the preſcription of her Phyſician, ſhe provoked a Vomit once a Month, by drinking plentifully Poſſet-Drink, by which ſhe was wont to caſt forth much thick tough Phlegm; alſo in the time of her being with Child, he let her Blood five times; the time of her going being over, ſhe was brought to bed of a Son, with very hard Labour; the Secundine came whole away, and ſhe purged notably: on the ſecond day, whilſt ſhe was lifted upon her feet in Bed, that the Sheets and the Blankets might be laid in better order, ſhe took cold, and by that means the bloody Lochia wholly ſtopped, and only a little ſerous Water came away: on the third day ſhe began to complain of an acute pain in her right ſide, to which the Women laid Bags of Camomil made hot with Bricks, but the diſtemper grew worſe with a bloody ſpittle; on the fourth day of her being brought to Bed, a moſt ſharp pain, with a difficult breathing, and very laborious, invaded her: by the preſcription of her Phyſician, then coming to her from the neighbourhood, ſix ounces of Blood was taken away, out of the Baſilic Vein, and ſhe felt ſudden eaſe; for ten hours ſhe was better, in the middle of the night the pricking pain returned with its wonted fierceneſs: at length, other Phyſicians being called to Counſel, they agreed that it was neceſſary to open a Vein again, in the Arm of the diſtempered ſide: four ounces of Blood being taken away, the pain remitted, and the ſick breathed better; then by Diaſphoretic Remedies, ſhe fell into a great ſweat, with a quiet ſleep: But the Pulſe was made quicker and weaker, alſo contractures of the Tendons in her wriſts appeared: preſently afterwards ſhe talked idly, and within twenty four hours, after ſhe was laſt let Blood, ſhe departed.

That this Lady fell into a Pleuriſie, with a Feaver, upon the Lochia being ſuppreſſed, the cauſe in ſome meaſure ſeemed to be, the letting of Blood ſo often in the time of her being with Child: for by this means, the Blood being accuſtomed to be eventilated at the Arm, afterwards growing hot, leaving the Womb, was carried violently towards the place of its letting forth, where, when it found not a paſſage, it fixed in the neighbouring ſide, as the next neſt to the place of extravaſation; yea, beſides the uſual manner of a Pleuriſie, there was no ſmall malignity hapned to this Diſeaſe; for the Blood being hindred from being let forth of the Veſſels, began preſently to be corrupted in its diſpoſition, and in the third day of the Feaver, was ſo much depraved, that it could not be any longer fermented in the heart ſo as to prorogue life.

It was not ſo with the Wife of a certain Smith, who was brought to Bed, at what time her Children had the Small Pox in the ſame Houſe, and ſhe her ſelf, as it ſeemed, had taken the Contagion of the ſame Diſeaſe, for on the ſecond day after her Delivery, they began to break forth with a feaveriſh heat, and pain in her Loyns, which indeed for three days, whilſt the Lochia moderately flowed, aroſe rightly into little ſwellings; altho' the purging of the Womb was very copious at that time, ſhe had the Small Pox very thick all over her Body, not only in the ſuperficies of her skin, but alſo they filled the cavity of her mouth and throat, ſo that ſhe could ſcarce ſpeak or ſwallow: The ſixth day of her Lying in, the Lochia flowed immoderately, from whence preſently fell upon the ſick, a frequent ſwooning, with a flagging of the Small Pox, Convulſions, and other ſymptoms of an ill nature, which threatned Death ſoon; being ſent for, I preſcribed half a dram of this Powder, to be taken conſtantly every three hours, in a ſpoonful of the following Julep, *viz.* Take of the Roots of Tormentil in Powder, drams two, of the beſt Bole Armonie, dram one, of the ſpecies of Hyacinth half a dram, make a Powder. Take of the Compound Water of Scordium, of Dragons, of Meadow-ſweet,

dow-ſweet, each three ounces, of Therecal Vinegar one ounce, of the Syrup of Corals two ounces, of Harts-horn burnt half a dram; make a Julep. Beſides, I ordered to be boiled in her Broths, and in every thing ſhe drank, the Roots of Tormentil; by theſe Remedies, the purging of her Womb was ſoon wholly ſtopp'd, and the Small Pox by degrees being ripened, came off without any grievous ſymptom.

Indeed this caſe was difficult, and was cured with great danger, *viz.* for either the Lochia, or the Small Pox to have been reſtrained inwardly, was very dangerous, and yet the more full eruption of the one, hindred the motion of the other; ſo long as either moderately proceeded, things being permitted to the conduct of Nature, was moderately well; but when one of them became ill, the work of Art was required, and it was requiſite to bridle the Lochia, but to provoke the Small Pox.

Chap. XVII.

Of Epidemical Feavers.

HAving meditated rather a Commentary, than an entire Tract, I had thought here to have concluded our Diſcourſe of Feavers: But foraſmuch as certain Epidemical Feavers do often ſpread, which obſerve no Laws, nor can be brought to no certain Rule of Doctrine, but being irregular, vary every year, and for that reaſon, as often as any of them increaſe or ſpread abroad, preſently it is call'd the New Diſeaſe; therefore I thought it worth our while, becauſe general Precepts concerning theſe Feavers, are not to be delivered, to ſubjoyn ſome particular Hiſtories, of ſome of this kind; for out of the various proviſion of Symptoms, whereby they are wont to be noted, the nature and the whole formal reaſon of theſe kind of Diſtempers, may ſomewhat appear. Since therefore of late years, within a ſhort Tract of time, three popular Diſeaſes have ſpred in theſe Countries, I will add, as a Crown to this Work, the ſeveral Deſcriptions of them, made at thoſe times, when theſe Feavers raged.

A Deſcription of an Epidemical Feaver, ſpreading about Autumn, in the Year 1657. taken in the middle of September.

WHilſt we meditate the Deſcription of a Feaver, at this time cruelly raging, it is fit, that following the example of *Hippocrates*, we firſt conſider the foregoing conſtitution of the Year, its intemperance and exceſs of qualities. For Epidemical Diſeaſes, and commonly excited among the people, are from a common Cauſe; ſuch as the habit of the Year, and by that means contracted, a diſpoſition of the Blood, by which many are alike affected. But that we may draw the Matter from the beginning, the laſt Spring, and the time ſucceeding it, even to the end of the Summer, was all that half years ſpace extreamly dry and hot, but eſpecially after the Summer Solſtice, the heats were ſo intenſe for many weeks together, that day and night there was none that did not complain of the heat of the Air, and were almoſt in a continual ſweat, and were not able to breath freely: About the Calends of *July*, this Feaver, at firſt ſporadical or particular, began to break forth in ſome places, that perhaps one or two were taken in the ſame City or Village: In many it imitated the likeneſs of an intermitting tertian Feaver, *viz.* the Fits returned every other day; which yet infeſted the ſick with a moſt intenſe heat, without any cold or ſhivering going before; Vomiting and Choleric Stools plentifully hapned to moſt, ſweat ſucceeding, but difficultly, and often interrupted, whereby the feaveriſh fit rarely ended in a remiſſion, but that all the time between, the ſick continued languiſhing and weak, with thirſt and reſtleſsneſs; in ſome, when the buſineſs began to grow better, after three or four fits, cold and ſhivering began the fits, and the Feaver became an exact intermitting Tertian; but in moſt, the Feaver ſtill grew worſe, and preſently became of an evil nature, and difficult cure, with a depraved proviſion of ſymptoms; for when the ſick were highly heated in their fits, and hardly ſweated, they were wont to commit errors, which daily increaſed the ſtrength of the Diſeaſe, becauſe by reaſon of the impatience of the ſick, and the unskilfulneſs of Servants, the ſweat being interrupted, which ſhould have ended the fit of the Feaver, after one fit was ſcarce finiſhed, another preſently ſucceeded, and ſo the Diſeaſe was wont to have wandring and uncertain periods, without any intermiſſion between, and afterwards to paſs into a kind of continual Feaver. The condition of which, ſome-

times being very dangerous, with an evil affection of the Brain and nervous ſtock, ſo that oftentimes a Lethargy, or Dilirium, or not ſeldom cramps and Convulſive motions, were excited: About the month *Auguſt*, this Feaver began to ſpread far and near, among the people, that in every Region and Village many were ſick of it; but it was much more frequent in the Country, and ſmaller Villages, than in Cities or Towns. It was ſtill like an intermitting Feaver, unleſs that it ſeemed more infeſtous than that is wont, and with more cruel fits, and ſhorter intermiſſions, and therefore was called the new Diſeaſe: beſides, it underwent the note of a certain malignity, and gave knowledg of its Contagion and Deadlineſs; inſomuch, that it crept from houſe to houſe, infected with the ſame evil, moſt of the ſame Family, and eſpecially thoſe familiarily converſing with the ſick; yea, old Men, and Men of ripe Age, it ordinarily took away.

If you reſpect the nature and eſſence of the Diſeaſe, this Feaver properly ſhould be referred to the rank of intermitting Feavers, for the Fits returned at ſet times, alſo for the moſt part they began with cold and ſhivering, and ofteneſt with vomiting, and by and by a moſt intenſe heat proceeding they were finiſhed, at laſt with a ſweat. The Urine in moſt appeared of a flame colour, thin in the fits, with ſome hypoſtaſis, without it more thick, and with a rediſh ſediment; altho with a moſt copious ſweat, and often iterated, the Diſeaſe was not cured, which might then be expected in a coutinual Feaver; yea, the diſtemper continued exceeding long, for many days, ſometimes months, tho much evacuation almoſt daily happned by vomit and ſweat; which we obſerve frequently in an intermitting Feaver, rarely to happen in a continual: out of the fit, at any time of the Diſeaſe a purge was profitably inſtituted, which in a Synochus before the ſign of concoction, were a wicked thing to attempt; beſides that this Feaver was of the intermitting kind, it ſeems to appear from hence, becauſe that very many recovered of, that ſcarce one of a thouſand died, which I ſcarce ever knew in an Epidemical Synochus. About the firſt bginnings of this Diſeaſe, it appeared very like to an intermitting Tertian, altho afterwards in ſome, by reaſon of the vitious proviſion of their body, and errors committed in Dyet, and ſweating it ſeemed to change into a continual; for in whom the fits were not rightly concluded nor ended in a remiſſion, by reaſon of the morbific matter not being throughly diſperſed, their Blood was continually hot, from whence in came to paſs, that the fits ſooner returned, and continued longer; till at length, by reaſon of the plenty of matter and the languiſhment of Nature, the Blood being made weaker endeavoured no longer to ſwell up and to ſeperate the feaveriſh matter, at ſet hours, but to ſubdue it by little and little, with a cantinual effervency.

We are to inquire concerning the cauſes of this Diſeaſe, what may be the leading, evident and conjunct cauſe, by the means of which is ſpread ſo generally, and became Epidemical through all *England*; by what means, and for what occaſion, it was wont to be excited in all men: and laſtly; what kind of alteration of the Blood and humors, being induced brought forth this kind of Feaver, with ſuch a proviſion of ſymptoms, and conſerved it in the Act.

I know it is eaſie to place wholly the cauſe of this ſo popular Diſeaſe in the malignant conſtitution of the Air, to wit, that the particles of the Aire which we breath, were infected by a certain extraneous Infection and not agreeable to our Nature, the little bodies of which Infections being admitted within, did ferment with the Blood and humors, and ſo in moſt, brought in this Feaver, almoſt with the ſame appearance of ſymptoms. For who dares deduce the Original of a Diſeaſe ſo generally raging from a leſs publick fountain? Or refer to any other place, the received cauſes of Diſeaſes, than to that neſt of Vital Air, on which every one feeds? But whilſt I more attentively conſider the thing, it ſeems to me, that its ſtem, and as it were its firſt beginnings, are to be ſought a little deeper. To wit, that this Feaver is born not from the Contagion communicated by the Air, and immediately fixing its evil on men, but rather from a certain feaveriſh prediſpoſition or nature, impreſſed ſomewhile before on our Bodies, becauſe of the intemperance of the Year, which at length having gotten maturity, on the leaſt occaſion is brought into Act, and ſo breaks not forth into this Feaver, ſo much as it ſifts it forth.

For when upon the Calends of *July*, the Air was immoderately hot, with a moſt intenſe heat for many days, it eaſily altered our Blood towards an hot and bilous intemperance, by which (as in wine growing more hot than it ſhould do) the ſweet part and the ſpirituous was much conſumed, in the mean time, the Saline and the Sulphureous was too much carried forth, that by that means, the liquor eaſily contracted a rancor or ſourneſs: We have in another place ſhewn, that this kind of diſpoſition of the Blood, whereby indeed it turns from a ſweet and ſpirituous temper, into a boylous or choleric, is moſt apt for an iutermitting Feavers: Hence the alible juice, which is continually carried into the maſs of Blood, is not rightly concocted, nor aſſimilated into Blood, but perverted as it were into extraneous and fermentative matter; which ariſing to a fulneſs in the boſom of the Blood it ſelf, and growing turgid according to its increaſe at ſet periods, as we have already ſhewn, induces the

the fits of the intermitting Feaver: when therefore, from the great burning heat of this Summer, the Blood almoſt of all men, becoming more hot than uſual, was very much ſcorched, it is no wonder, if from thence it ſhould contract a great aptitude for intermitting Feavers. But why not whileſt the fervor of the Heaven was yet urgent, but a little after, this Diſeaſe ſpread it ſelf, the reaſon is, becauſe this indiſpoſition is not impreſſed on our Blood at once or at one time, but by little and little, and not but of along time; and therefore Diſeaſes like Fruits, are chiefly ripened in Autumn, after the foregoing heat of the Summer.

This aptitude or feaveriſh diſpoſition, all do not contract alike; thoſe whoſe Blood is of a more hot Nature, and abounds more in Sulphur, and for that cauſe is ſooner ſcorched, alſo ſuch who labour, or ſtay long in the heat of the Sun, and open Air, by reaſon of their Blood being more remarkably torrified, more eaſily fell into this Diſeaſe; wherefore, at firſt, it chiefly raged among Husbandmen in the Country: of theſe, who had required an aptitude to this Feaver, from the Blood being before ſcorched, ſome perhaps fell into this of their own accord, the feaveriſh diſpoſition being leiſurely carried forth to a maturity; others by reaſon of a light occaſion or evident cauſe, which was wont otherways to ſtir up the feaveriſh burning, as from taking Cold, Surfeit, drinking of Wine, and the like; and others fell ſick from the Contagion received of others, for as the *effluvia* conſtantly came away from the ſick, when they peirced Bodies prediſpoſed to the like diſtemper they eaſily excited the hid powers into Act.

As to the third Propoſition, to wit, that the conjunct cauſe of this Diſeaſe, and its formal Reaſon, may be known, we muſt put you in mind of thoſe things, which we have elſewhere delivered concerning the nature of intermitting Feavers, for we ſuppoſe the torrid and bilous conſtitution of the Blood, as the baſis of this Diſeaſe, by reaſon of which the alible juice being ſupplied daily, as it were in a certain meaſure, is not rightly concocted, but by the aſſation or ſcorching, becomes or goes into a fermentative matter, not miſcible with the Blood. When the Blood is filled to a fulneſs with this matter (which happens at ſet intervals of times, becauſe the alible juice is ſupplied as it were by a ſet meaſure) it of its own accord conceives a ſwelling up, and the growing hot or effervеſcency being excited, for the carrying away of this matter, cauſes the feaveriſh fit: which ſo long indures till this feaveriſh matter being inkindled, and as it were burnt in the heart, is wholly diſſipated with ſweat.

From theſe things premiſed, it is made plain, that in this diſtemper, we now diſcourſe of, there are ſome things happen by a peculiar way, from the common kind of intermitting Feavers, and therefore it was noted, that not undiſervedly, with the appellation of a new Feaver; which are, Firſt, that about the beginning of the Diſeaſe, fits did a long while afflict the ſick, without cold or ſhaking, but with a moſt intenſe heat, thirſt, and cruel vomiting; by which, the ſweat hardly, and for the moſt part partial, and often interrupted, ſucceeded, whereby the fit was not finiſhed but of a long time. The reaſon of which, may be only laid upon the very choleric diſpoſition of the Blood, and being above meaſure ſcorched: For this proceeding from the domineering Sulphur, wholly inhibits the wonted ſourneſs of the Blood, which follows its turgency or ſwelling up, and is wont to ſtir up the cold or ſhivering; and by reaſon of this kind of temper of Blood, too much roaſting and as it were burning the alible juice, the Blood growing turgid, together with that juice, and being ſtirred up into motion, is inkindled more then it was wont in the heart, and by its deflagration, induces a moſt intenſe and troubleſom heat, with thirſt, to the ſick. Choleric vomitings, happen not only at the beginning but in the middle of the fit, by reaſon of the abundance of choler, with which, the Choleduct Veſſels being too much filled infuſe the inteſtines; which then a Convulſion being ſtirred up, is eaſily emptied into the Ventricle: Sweat hardly ſucceeds, becauſe the bile abounds more than the ſerum, wherefore the Feavouriſh matter being burnt, it is not eaſily ſifted forth by ſweat, but being either mingled with the Blood, cauſes the long effervency, or being carried towards the inteſtines, produces vomiting or a Flux. Secondly, This Feavour differs from the vulgar intermiting Feavour, becauſe after the fit was ended, there was no full intermiſſion, even to a remiſſion, but the ſick ſtill remained languiſhing and thirſty; and as to appetite, ſleep, and other accidents, very ill: which indeed happened, becauſe, by the intenſe heat of the fit, more of the Blood and feaveriſh matter is inkindled, than that its recrements remaining after its deflagration, are able preſently to be diſſipated, eſpecially, becauſe the ſweat, by reaſon of the dryneſs of the matter, very hardly ſucceeds, nor is the Feaveriſh matter enough diluted with the ſerous *Latex*, to be ſifted forth; wherefore, the Blood by its Contagion in the time of the fit, not being perfectly freed, grows hot ſtill, neither the fit being ended, doth it get any full truce from the diſeaſe: In the mean time, whilſt the Blood is urged after this manner, with almoſt a continual effervency, it differs from a Synochus; becauſe in this, the Sulphureous part of the blood, being too much carried forth, and as it were inflamed, cauſes the Feaver by its deflagration; but the continual ebullition,

which

which after this manner comes upon this intermitting Feaver, wholly depends upon the confusion of the not miſcible matter, and its hard ſecretion from the Blood. The Synochus happens like Wine growing hot of its own accord, by reaſon of its richneſs, the other conceives its fury, like the ſame Wine, by reaſon of ſome heterogeneous thing powred to it: wherefore we remark, that whilſt our Feaver is ſeen ſtill to be continual, it is not cured by Sweat or the Flux of the Belly, altho they frequently and copiouſly happen; becauſe it depending upon the Blood being depauperated, rather than being inflamed, it continues long, and diſpoſes the ſick towards a Cachexie.

3. There is a third reaſon of difference, by which this Feaver may be diſtinguiſhed from the common rank of intermitting Feavers, and it is this, that it is eaſily propagated to others by contagion; the reaſon of which is, becauſe here very many Bodies are prediſpoſed after the ſame manner, towards the ſame Diſtemper, which happens not at another time; wherefore, the meer Effluvia's from a diſeaſed Body, are able to excite the like effect, in a very fit ſubject; even as ſome beams of Flame enkindle Flame, in a very combuſtible matter: In the mean time all do not alike contract the Infection of this Feaver, but that ſome being leſs prepared or fitted for it, converſe with the ſick without harm.

4. There is another Symptom occurs, not conſtant to this Feaver, but only hapning in ſome places, that diſcriminates it not only from the common, but varies its own proper type; to wit, ſometimes it happens, this Diſeaſe to be accompanied with a Dyſenterick Diſtemper; in ſome Cholerick Vomits, and Bilous Stools very much infeſt; and in others Bloody Stools follow, with cruel pains and torments of the Belly. The former I often obſerved in our Neighbourhood, and the reaſon of it may be deduced from the higheſt bilous temper of the Blood: For by reaſon of this, the aduſt matter, not to be diſſipated by Sweat, is copiouſly ſifted into the Liver; then by reaſon of the Choler-carrying Veſſels, being filled to a flowing over, it is ſent away to the Ventricle and Inteſtines. The other Dyſenterical Diſtemper was found only in ſome places, and there peculiar rather than common, it laid hold only of ſome ſick. The Origine of it may be referred to the peculiar diſpoſitions of ſome Bodies, or vicious proviſion, alſo to the ſite of the place, or condition of the Air; then the Diſeaſe is to be ſuſpected, to be thence tranſlated to others, not without the communication of a certain infection.

There is to be had a double Prognoſtication concerning this Diſeaſe: Firſt, of the Feaver in General, what end it ſhall have, when, what it may threaten to the Land: whether it precede not (which is commonly feared) the Plague, or Peſtilential Sickneſſes. Secondly, The ſigns ought to be laid down, whereby we are wont to preſage health, or danger, in the various caſes of the ſick.

As to the firſt, Becauſe we have ſhown that the Origine of this diſtemper is not to be fetched from the Contagion of the Air, or its being infected with any venomous Infection, nor from any malignant ſeeds of Vapours diffuſed through the Air, but only from the ſignal bilous temper or diſpoſition of our Bodies, with the Blood being made aduſt and roaſted extreamly, by reaſon of the Summer heats, I think there is no reaſon of fear, that this Feaver ſhould be carried forth into any thing worſe by the vice of the Air, or might at length grow to be Malignant or Peſtilential. But rather (that the ſeaſon of the Year being changed, and the alteration of our Blood aſſuredly to be expected) we might fear leſt this Feaver, which now imitates the way of an intermitting Feaver, ſhould afterwards paſs into a Quartan, the Blood growing into a melancholy temper. Which thing indeed I obſerved to happen to ſome already, and I believe, that before the Autumn be fully paſſed over, will happen to many more.

As to the particular Prognoſtication, the chiefly notable ſigns, which occur in the courſe of this Feaver, and in a manner foretel its condition and event, are of this ſort; if the Diſeaſe happens in a firm Body, well tempered, and eaſily perſpirable; if vomiting with eaſe ſucceeds, and that the Belly be looſe: if the fit begins with a light ſhivering, and afterwards a moderate heat, with ſweat concludes it, and that the intermiſſion be with ſome tolerable remiſſion; if the Pulſe be ſtrong, the Urine of a flame colour, clear, and with a laudable hypoſtaſis, we may Predict that the Diſeaſe will quickly end without any danger. But if this Feaver be excited in a fat Body, and of a vicious habit, if with troubleſome vomiting, an intolerable thirſt, and fierce heat, long exerciſe the ſick; if to the heat a difficult ſweat, and partial, and often interrupted, and between frequent vomitings ſucceed, and that it ends not in a remiſſion, we may declare, that this Diſeaſe may be long, and of a dangerous iſſue. But if the ſick remain in ſtrength, and the Urine ſhew ſigns of concoction, we need not diſpair of health; eſpecially, if after four or five periods, the Diſeaſe, as it is wont to do, remits of its wonted fierceneſs. Thirdly we obſerve, if this Diſeaſe is excited in an old Body, or others broken with ſickneſſes, or debilitated; if beſides horrid vomitings, there happen ſwoonings, faintings, Deliriums or Lethargic diſtempers; if after many fits, the ſick having loſt their ſtrength, the Diſeaſe remits nothing, but exerciſeth the Blood, with a continual effervency, and that the Vital Spirits are much deſtroyed; if the appetite be loſt, wakings pertinacious, and that they have

have Convulsive motions, with a weak Pulse, and Urine troubled, or thick, we judge the matter to be full of danger: yet is not the sick to be left as desperate, because the Disease is not hasty, and kills not suddenly, and out of hand; but is drawn out at length, and grants time and occasions to nature, of recollecting her self, and to the Physician, of giving Remedies.

The Therapeutic Indications, which have place in the Cure of this Feaver, are chiefly four. First, That the Blood being now scorched, and made too cholerick, may be reduced to its due temper. Secondly, That the depravation of the nourishable juice, and its alteration into a fermentative matter, may be inhibited, or at least lessened. Thirdly, That about the declining of the Disease, the Blood depauperated by a frequent deflagration, and made more impure by the fusion or pouring into it the morbific or adust matter, may be restored, and rendred as it should be volatile. Fourthly, That the symptoms, which chiefly infest in the course of the Disease, may be timely helped by fit Remedies; that these intentions may be satisfied, I counsel that this following method be used.

About the beginning of the Disease, if the bilous or choleric humor, flowing forth of the choler-bearing Vessels, and being suffused into the Ventricle, cause the sick to be prone to vomiting, let a more plentiful evacuation be procured, by a gentle Emetic in the time of the fit: The opening of a Vein, and Purging, ought not to be administred, unless between the fits: for whilst the Blood grows mainly hot, or is resolved into sweat, Nature ought not to be called back from the Work begun, nor her endeavours to be disturbed, by the prescriptions of Physicians; wherefore, after the fit being past, and the sweat throughly finished, a Purging may be instituted, by a gentle Cathartic, and the same afterwards sometimes repeated, on the like occasion: for by this method, not only the provision of the excrementitious matter, is brought away, from the first passages, but chiefly the choler-bearing Vessels being emptied, the choler is copiously drawn forth from the mass of Blood, and by that means the Blood is restored to its natural Crasis or disposition. The letting of Blood, if it be indicated, should be performed presently after the beginning; for so its Liquor being too turgent or swelling up, is eventilated, whereby both the nutritious juice is less perverted, and the fit urging, it burns forth with a less heat, together with the morbifick matter: but otherwise, if a Vein be opened after a long sickness, when the Blood being made poorer, and more watry, more of the morbifick matter is heaped together, and does not rightly concoct, and sift it forth, it detracts much from the strength of Nitre, and nothing from the power of the Disease. In the interval of the fits, when there is no place for opening a Vein, nor Purging, let the Belly be kept loose, by the constant use of Clysters; also digestive Remedies, of acetous or saline Liquors and Powders, are to be exhibited; of which sort are Cream of Tartar, fixed Salts of Herbs, Tartar Vitriolate, Harts-horn burnt, Spirit of Vitriol, and Salt, *&c.* for these restore the lost or sleepy ferments of the Viscera, purifie the Blood by fusing it, also separate the morbifick matter, and as it were precipitate it: also, at this time between, if pertinacious waking infest the sick, and overthrow their strength, it may be lawful to administer anodyne, and gentle narcotic Remedies; but never in the fit: for then they greatly hinder the subduing, and sifting forth of the feaverish matter, and draw out in length the fit that would end sooner.

These things are to be done about the interstitia, or intervals of the fits; but whilst the fit is urgent, altho' the sick then chiefly send for, and call upon Physicians, yet at this time their Prescripts are limited to a narrower space: If Vomiting (notwithstanding an Emetic being given) still infest, it may be more freely provoked, either by simple Posset Drink, or with bitter Herbs boiled in it: But let the chiefest means of help be, in temperating the heat and thirst, which most grievously torments the sick in this Feaver: For whilst the Blood growing hot, with the morbifick matter, and being inkindled in the Heart, leaps forth into the Lungs, stirs up there a cruel Inflammation, which requires a profusion of a cold humor, as it were for the extinguishing the Flame; wherefore they greedily desire without any measure drink, for want of which the sick are almost killed with too great heat, and their Blood being almost wholly rarified into flame and fume, the thrid of Circulation is hardly continued; wherefore, drink ought to be wholly granted, to those in Feavers: which however, if it be taken in too large a quantity, it at first more disturbs the estuating Blood, and at length brings confusion to the feaverish matter, begun to be separated; that from thence, the Work of subaction and secretion is longer protracted, and the fit is made longer: also, besides, large drinking causes troubles in the Ventricle, and by disturbing it, and often provoking Vomiting, hinders the breathing forth, and calls inward the sweat breaking forth, or perhaps already broke forth: wherefore, at first, the heat of the Feaver being inkindled, altho' the sick be very thirsty, let them only sip a little, and abstain from drink as much as they can; afterwards, when the matter being burnt, and subdued, begins to be dissipated by sweat, they may be more freely indulged as to this, for so the sweating is greatly helped, and the fit is sooner finished: as to the nature of the Drink, let them take sometimes Posset Drink, sometimes Small Beer,

Beer, or Barly-Water, and ſometimes ſimple Water, or ſharpned with the Juice of Limons: In this caſe, the uſe of Sal prunellæ is deſervedly praiſed, to be given in every Liquor; for this, with its nitroſity, wonderfully allays the raging Blood, and potently moves Sweats: I have often obſerved, in the midſt of a Fit, the ſick wont to fall into a Swoon, or Syncopy, to whom preſently they give Cordials or hot Waters, that much increaſe the violence of the Feaver, and bring forth more troubles than uſual, that the Fit is more difficultly finiſhed; but theſe faintings, for the moſt part, happen, either from a bilous humor ſuffuſed in the Ventricle, or by reaſon of the ſweat ſuddenly breaking forth; and againſt theſe, I always found the moſt preſent Remedy, that either a feather being put down the throat, Vomiting may be provok'd, or that Liquor being plentifully drunk, a ſweat may be again raiſed up; alſo in the whole courſe of this Feaver, I am wont never to give any Cordials, or Alexiteriums.

The Diet in this Feaver ought to be only ſlender, and not nouriſhing, all ſorts of Fleſh, or any prepared of them, are wholly to be avoided; for as theſe abound with Sulphur, they give a more plentiful food (as Oyl poured on Flame) to the hot or enkindled Blood: Beſides, nothing ſpirituous, as ſtrong Waters, ſtrong Beer, or Wine, is to be yielded to; but Decoctions, or Broths of Oatmeal, or Barly, altered with cooling Herbs, are chiefly to be uſed; alſo Poſſet-Drink, and Small Beer, or Whey, is to be given them at their pleaſure: for by this means, when a very ſlender and watry nouriſhing Juice is conveyed to the maſs of Blood, the ſoluted Particles of Sulphur, burn forth ſooner, and with the leſs tumult; alſo the Recrements of the aduſt matter are more eaſily carried from the boſom of the Blood; but if on the contrary, a more rich or plentiful Nouriſhment be adminiſtred, the effervescency of the Blood is thereby very much augmented, and the Blood is more infected, by the confuſion or pouring in of the aduſt matter.

After that the Blood being much burnt forth by frequent fits, and the Feaver being in its declination, remits of its fervor and fierceneſs, you muſt take heed, leſt the ſick at length growing well, fall not into a Cachexy, or Scorbutic Diſtemper; for the diſpoſition of the Viſcera being hurt, and the Blood being much depauperated, the alible Juice, though not ſcorched ſo as at firſt, is not however rightly concocted, and ripened into perfect Blood; but by reaſon of the want of Tranſpiration, the ſerous Excrements being imbued with a fixed Salt, are greatly heaped together, and now fixed in the Bowels, now in the extreme Parts, bring forth various Diſtempers. Wherefore in a long languiſhing of the ſick, or otherwiſe for the ſake of being ſooner well, Remedies ſhould be given them, which volatilize the Blood, or hinder the ſtuffings of the Viſcera, or if ſtuffed, may open them, and their ferments as if extinct, reſtore: for this uſe, thoſe Remedies and Preparations chiefly help, which are commonly called Digeſtives and Antiſcorbuticks; with which, being timely adminiſtred, I have known very many weak, pale, and as it were without Blood, ſuddenly to recover a Livelineſs and Vigor.

The Deſcription of a Catarrhal Feaver Epidemical in the middle of the Spring, in the Year 1658. *taken the fourth of* June.

AN equally intenſe Froſt followed the next Winter, the immoderate heat of the foregoing Summer, ſo that no one living could remember ſuch a Year, for either exceſs both of heat and cold. From the Ides of *December*, almoſt to the Vernal Equinox, the Earth was covered with Snow, and the North-Wind conſtantly blowing, all things without doors were frozen: Alſo, afterwards, from the beginning of the Spring, almoſt to the beginning of *June*, the ſame Wind ſtill blowing, the Seaſon was more like Winter than Spring, unleſs now and then a hot day came between. During the Winter (unleſs that a Quartan Feaver contracted in Autumn, infeſted ſome) among our Countrimen, there was a moderate ſtate of Health, and freedom from all popular Diſeaſes. The Spring coming on, an intermitting Tertian (as uſed to do every year before) fell upon ſome. About the end of *April*, ſuddenly a Diſtemper aroſe, as if ſent by ſome Blaſt of the Stars, which laid hold on very many together; that in ſome Towns, in the ſpace of a Week, above a thouſand People fell ſick together. The particular ſymptom of this Diſeaſe, and which firſt invaded the ſick, was a troubleſom Cough, with great ſpitting, alſo a Catarrh falling down on the Palat, Throat and Noſtrils; alſo it was accompanied with a feaveriſh Diſtemper, joyned with heat and thirſt, want of appetite, a ſpontaneous wearineſs, and a grievous pain in the Back and Limbs; which Feaver however was more remiſs in ſome, that they could go abroad, and follow their Affairs in the time of their ſickneſs, but complainining in the mean time, of want of ſtrength, and of languiſhing, a loathing of Food, a Cough, and a Catarrh: But in ſome a very hot Diſtemper plainly appeared, that being thrown into Bed, they were troubled with burning, thirſt, waking, hoarſeneſs, and coughing, almoſt continual; ſometimes there came upon this a Bleeding at Noſe, and in ſome a bloody Spittle, and frequently a bloody Flux; ſuch as were

were indued with an infirm Body, or men of a more declining Age, that were taken with this Diſeaſe, not a few died of it; but the more ſtrong, and almoſt all of an healthful conſtitution recovered; thoſe who falling ſick of this Diſeaſe, and died, for the moſt part died by reaſon of the ſtrength being leiſurely waſted, and a ſerous heap more and more gathered together in the Breaſt, with the Feaver being increaſed, and a difficulty of Breath, like thoſe ſick of an Hectic Feaver. Concerning this Diſeaſe, we are to enquire, what procatartic cauſe it had, that it ſhould ariſe in the middle of the Spring ſuddenly, and that the third part of Mankind almoſt ſhould be diſtempered with the ſame in the ſpace of a Month; then the ſigns and ſymptoms being carefully collated, the formal reaſon of this Diſeaſe, alſo its Criſis and Way of Cure ought to be aſſigned.

That the Northern Wind is moſt apt to produce Catarrhs, beſides the Teſtimony of *Hippocrates*, common Experience doth make known: But why Catarrhs did not ſpread, at leaſt in ſome peculiar places, all the Winter and Spring, but only in one Months ſpace, and then joyned with a Feaver, this Diſtemper ſhould become Epidemical, doth not ſo plainly appear. I know many deduce the Cauſe from the unequal Temper of the Air at that time; which although for the moſt part very cold, yet the North-Wind ſometimes leſſening, there would be a day or two very hot between: wherefore from this occaſion, as from cold taken after the heat, men ſhould commonly fall ſick: But indeed, for the exciting the Diſtemper, ſo ſuddenly riſing, and commonly ſpreading, there is required, beſides ſuch an occaſion, a great foregoing Cauſe or Prediſpoſition, though the other might ſuffice perhaps, for an evident cauſe, for to diſtemper them with this Sickneſs; for we ought to ſuppoſe, that almoſt all men were prone to the receiving this Diſeaſe, otherwiſe no evident cauſe could have exerciſed its power ſo potently on ſo many; wherefore, it ſeems very likely, that this Diſeaſe had its Origine from the intemperance and great inordination of the Year: and as the Autumnal intermitting Feaver before deſcribed, was the product of the preceding immoderate heat, ſo this Catarrhal Feaver depended altogether upon the following part of the Year, being ſo extreamly cold; for the Blood being now throughly roaſted, by the very hot Summer, and prone to the Feaver before deſcribed, then being made more ſowriſh by the Autumn urging it, and apt for a Quartan Feaver, afterwards being a little eventilated by reaſon of the ſtrong Cold of the Winter, and hindred from its due perſpiration, retained yet its Dyſcraſie, or evil Diſpoſition, and readily broke forth on the firſt occaſion given: wherefore, when the Blood, in the middle of the Spring (as the Juice of Vegetables) being made more lively, and alſo begun to flower, and grow rank, by reaſon of the ſtoppage being ſtill continued, was ſtraitned in its Circulation, and eaſily made prone to a feaveriſh effervеſcency: and as the ſerous Water redounding in the Blood, could not evaporate outwardly, becauſe of the Pores being ſtill ſtraitned by the cold, reſtagnating within, and chiefly falling upon the Lungs (where it might be moved about, inſtead of an outward breathing forth) excited the ſo frequent and troubleſome Cough.

The Original therefore, and formal Reaſon of this Diſeaſe, are founded chiefly on two things, to wit, that there together hapned a greater effervеſcency of the Blood than uſual, from the coming on of the Spring-Seaſon, and alſo a Stoppage, or great conſtriction of the Pores, excited by the too great Cold of the foregoing Seaſon; that therefore there was not a free ſpace granted to the Blood, flowring or luxuriating in the Veſſels: the buſineſs being after the ſame manner, as if Wine begun to grow hot, ſhould be put up into cloſe ſhut Veſſels; for by this means, either the Veſſels, or the Liquor were in danger to be loſt.

Wherefore, that we may contract the thing in ſhort, the cauſe that this Diſeaſe begun in the middle of the Spring, having preſently ſpred largely, ſeized very many, was not the blaſt of a malignant Air, whereby the ſick were diſtempered, as if ſtruck with a blaſting, but that at this time, the Blood being inſpired by the conſtitution of the Spring, and ſo luxuriating, and apt to grow hot, was contracted or ſtraitned in its motion, and the effluvia's being conſtrained inwardly, could not be ſufficiently eventilated or cooled. In every year, tho temperate, it is uſual in the Spring and Autumn for ſome Epidemical Diſeaſes to reign, becauſe at this time, the Blood being as it were reſtored, flowers anew; and therefore, intermitting Feavers, and ſometimes the Small Pox ordinarily ſpread in this Seaſon; wherefore, 'tis no wonder, after a great unequal conſtitution of the Year, and not natural, when in this Spring, the Blood boyling up more lively within the Veſſels, by reaſon of tranſpiration being hindred, could not be freely circulated, and ſufficiently eventilated, if for that cauſe, great diſorders follow, and from this moſt common cauſe, a Diſtemper greatly Epidemical ſhould be excited.

As to the Symptoms joyned with this Diſeaſe, a feaveriſh intemperature, and whatſoever belongs to this, the heat of the *Præcordia*, thirſt, a ſpontaneous wearineſs, pain in the Head, Loyns, and Limbs, were induced from the Blood growing hot, and not ſufficiently eventilated; hence in many, a part of the thinner Blood being heated, and the reſt of the Liquor being only driven into confuſion, a ſimple Synochus, or of more days was induced, and this

for the moſt part ceaſed within a few days: But in ſome endued with a vicious diſpoſition of Blood, or evil habit of Body, this kind of Feaver ariſing by reaſon of the ſame cauſe, quickly paſſed into a very dangerous Putrid Feaver, and often Mortal.

The Cough accompanying this feaver with a Catarrh, draws its Origine from a ſerous humour heaped up together in the Blood, by reaſon of tranſpiration being hindred for a long time, and then an effervescency being riſen, dropping forth more from the little Arteries, gaping within; for when the Pores are conſtrained, the ſuperfluous ſeroſities in the Blood, being wont to evaporate outwardly, are poured forth on the Lungs, by a proper caſtration or cleanſing of the blood, wherefore, by taking cold (as they commonly term it) that is, from tranſpiration outwardly being hindred, the Cough for the moſt part is ſtirred up: And for a foregoing cauſe to this Diſtemper, the flowing forth of the ſerum into the Maſs of Blood, hath for the moſt part the chief place; for, from the long cold hindring the ſcorching of the blood, or the proviſion of the Bile, and prohibiting the breathing forth of the watry humor, there was a neceſſity, that very much of the ſerous Humor ſhould be heaped up in the Blood: wherefore, when the Blood flowring in the Spring, conceived a heat, the flowing forth of the Serum, and a powring of it on the interior parts, was wont to cauſe firſt the Cough, as the proper ſymptom of this Diſeaſe; and thoſe, whoſe Blood was more diluted by the mixtion of the Serum, and who were greatly obnoxious to the Cough, and a Rheumatic Diſtemper, were cured with leſs trouble of the feaveriſh Diſtemper. The Prognoſtick of this Diſeaſe, concerning private perſons, is for the moſt part eaſie, that one may deliver the event, from the firſt aſſault; for if this ſickneſs be excited in a ſtrong body, and healthful before, and that the feaveriſh Diſtemper be moderate, and without any grievous and horrid ſymptom, the buſineſs is free from danger, and the Diſtemper is to be accounted but of light moment, as that commonly is of catching Cold, neither needs a Phyſician be conſulted, nor Remedies, unleſs trivial and ordinary, be adminiſtred: But if this Diſtemper happens in a weak and ſickly Body, with an evil proviſion, or that the Feaver being carried into putrid Feaver, or the Cough growing grievous, induces difficult breathing, and as it were a tabid or conſumptive diſpoſition, the event of the Diſeaſe is much to be ſuſpected, and often terminates in Death. The common Prognoſtic that was taken from hence, concerning the future ſtate of the Year, contains nothing to be feared, or ominates any great ill; by reaſon of the unequal intemperance of the Year, the great heats, and then exceſſive cold, we might fear Diſeaſes to ariſe from the Dyſcraſie of the Blood, yet from the preſent condition, we need neither ſuſpect any noted depravation of the Air, or Infection with poyſonous breaths; that from thence may be had any Judgment of the Plague, or Malignant Diſeaſe to be at hand.

As to what belongs to the Cure, when this Diſeaſe is more lightly inflicted, its Cure for the moſt part is left to Nature; for this Feaver, when it is only a ſimple Synochus, is wont to be cured within a few days by ſweat: wherefore, by a copious ſweating, for the moſt part about the third or fourth day, the heat and thirſt, the wearineſs, and heavy pains are allay'd; then the Cough being ſomewhat longer protracted, by little and little afterwards remits, and at length the ſick leiſurely grow well; if this Diſeaſe hath rooted it ſelf more deeply, there is need of fit Remedies, and an exact method of curing; the Feaver growing worſe is to be healed, according to the Rules to be obſerved in a Putrid Feaver; but nevertheleſs with this difference, that, becauſe tranſpiration being hindered, and the ſuffuſion of the ſerous humour on the Lungs, are chiefly in fault, therefore Diaphretic Remedies, and thoſe called Pectoral, are of more frequent uſe; for theſe reſtrain the flowing forth of the Serum from the Veſſels within, or by opening the Pores, convey it forth of doors; or precipitating it from the boſom of the Blood, ſend it forth by the Urinary Paſſages; therefore the Method of Medecine for this Diſeaſe, being brought into the worſer ſtate, reſpects both the feaveriſh intemperance, for the ſake of curing which, you are to be directed, according to the intentions ſhewn in the Putrid Feaver, and alſo the Rheumatic Diſtemper, which however let it be ſecondary, and not every expectorating Remedy, or thoſe uſed againſt a Cough, are to be admitted, but of that kind only which do not increaſe the Feaver: the forms of theſe, and the means of curing, are to be ſought from the Precepts delivered generally for the Cure of the Putrid Feaver, and of the Cough; the Helps, which now by frequent experience, are commonly ſaid to bring Cure chiefly in this Diſeaſe, are ſweating, or the provoking of Sweat, and letting of Blood; for the Veſſels being emptied by this or that means, both the immoderate heat of the Blood, and the abundance of the Serum are reſtrained.

A Deſcription of an Epidemical Feaver ariſing about the beginning of Autumn, 1658. *taken the* 13*th. of* September.

THE Vernal Feaver but now deſcribed, did not laſt longer than ſix weeks, that it plainly was ſeen, that it was only a more light flowring of the Blood, which ſwelling up in the Spring, and at the ſame time ſtreightned in ſpace, for want of ventilation, moſt impetuouſly boyled

boyled up, like new Wine close shut up in bottles, and then ceased of it self. Yet from thence, as neither the year, so neither our blood did recover its due temperature, and so another Tinder or Nest for a new Feaver, was quickly gathered together: because after the Summer Solstice, the North wind still blowing, a cold season remained for a long while; so that the Fruit and Corn this year, was feared by the Husbandmen, would scarce be throughly ripened; but after this, a little before the beginning of *July*, a most fierce heat followed, for several days; and when the Dog-days were begun, the Air grew most cruelly hot, that one could scarce endure the open Air. By reason of this Heat and Cold in excess, the temperature of this Year was very unequal: wherefore, there was a necessity for our Blood to be now fixed, and as it were congealed, now too much roasted, and so perverted from its natural disposition, to a scorched and Melancholy Temper; also it came to pass that the Pores of the skin were much altered from their right constitution, that by that means, an insensible transpiration could not be performed after the wonted manner.

From the time that the former Feaver ceased, almost to the end of the Dog-days, there was a state of Health, and free from all Popular Diseases; but then a few here and there among the Villages, and in lesser places, first fell sick; but afterwards, about the end of *August*, a new Feaver suddenly arising, began to spread through whole Regions, every where round about us; also this, as the other which spread the last Autumn, raged chiefly in Country Houses and Villages; but in the mean time, few of the Inhabitants of the greater Towns and Cities fell sick. At the same time, in other Regions, situate at a distance from us, almost throughout *England*, the Epidemical Feaver was said to rage; and in some other places, to be far more deadly than it was about our Country. Perhaps the Idea of this Feaver now reigning had not the provision of its Symptoms alike in all places, or was noted wholly with the same Appearances and Accidents: yet whatever it shewed in our parts, as to its Nature, I shall briefly and succinctly add, from our own proper observation, or what I had learnt, being communicated from others.

About the beginning of this Disease, its figure was wandring, and very uncertain; because in some there was a continual fervor, in others it was intermitting, being renewed by set fits; but at this time it happened to very many, as a pathognomic Symptom, that they were ill in their Brain and Nervous Stock, that presently from the very beginning of this Feaver, almost all complained of their Head being grievously distempered; For a cruel Head-ach infested some, and hardness of hearing, with a noise in the Ears troubled others, but to most was wont to happen, either a stupidness, and heavy sleepiness, with a vertiginous Distemper, or pertinacious wakings, with a Delirium, and distractions of the Animal Spirits. I have observed in some, that on the first or second day of their Sickness, that little broad and red spots, like to the Measles, have leisurely broke forth in the whole Body, which being shortly vanished, the Feaver presently became stronger, and especially the Distempers of the Head, far more grievous. From thence a benummedness of the Senses, and a Sleepiness fell upon some for many days, that they lay a long while as if dying, without speaking, or knowledge of their Friends. I knew others to have fallen from hence into a Lethargy, and others cast into an Apoplexy, and some into a Phrensie and Delirium. Of these the younger and strong men (yet not without a long languishment, and doubtful recovery) most of them escaped; in the mean time, old men, or other ways weak and sickly, generally died. Those who fell sick with the Feaver, as it were continual, with those notes of malignity, were more rare, and the distempered were only sporadically, in some Houses only, But the Sickness which most commonly spred about us, fell upon most, and tho it cruelly raged, it seemed to imitate an intermitting Feaver, to wit either a Tertian, or a Quotidian; for that the sick had fits, either every day, or (which I more often observed) every other day, which infested them grievously, and a long while, with Cold, Heat and Sweat, succeeding in order: but these kind of fits, as also the course of the whole Disease, were wont to be noted with diversity, according to the Age and Temper of the Sick, and with various concourse of Symptoms and Accidents. Yet this was common to most of (I had like to have said all) the sick, that together with the Feaver, they were troubled with Cephalic Distempers.

When therefore any one was troubled with this Disease (whether the Sickness was excited from an evident Cause or Contagion, or without any manifest occasion) its coming betrayed it self by a Pain in the Head, and often in the Loyns, with Thirst, Want of Appetite, spontaneous Weariness, and Heat tho not strong: If it hapned in a young Body of a florid Blood, and more hot temper, the Fits wanted the Cold and Shivering, about its beginning, but they were very troublesome and sharp, with long heat: The sick were often troubled with Vomiting, and their Head aked cruelly for the most part, Sweat difficultly succeeded, which being often partial and quickly broke off, rarely cured the Fit, but when the Sweat failed, they grew hot again, that scarce in eighteen or twenty four hours the Fit was finished in some. In the mean time, from the Blood being very fervent, the Phantasie was disturbed, that oftentimes a Delirium, absurd or idle Talking, Wakings, and high Inquietudes were stirred up during the Fit;

but the ſame being finiſhed, in the time between, ſtill a troubleſom Thirſt, a ſlow Heat, Languor of Spirits, and great Debility of ſtrength, with an Head-Ach, and a vertiginous Diſtemper, for the moſt part moleſted them. It was rarely found, for any to find themſelves indifferently well, as in a common Tertian, between the Fits. About the beginning of the Diſeaſe, the feaveriſh Fierceneſſes were ſomewhat more mild, which afterwards at every turn, leiſurely grew worſe, and then began with Cold and Shaking; to which nevertheleſs, after a long and very troubleſome heat, Sweat very hardly ſucceeded in moſt, ſo that the Fit rarely ended in its due temper. Within ſix or ſeven Periods, the ſtrength of the Sick was much caſt down, that being made languid and weak, they had an hard task to ſtruggle with the Diſeaſe; becauſe unleſs Nature were ſuccoured by Art, the Feaver ſtill prevailed, and rarely or never in a ſhort time, was it cured by a Criſis, or leiſurely remitted; but it brought the ſick into great ſtreights, by its long ſiege, and ſtill perſiſting, till the Blood being by its frequent deflagration made very liveleſs and watery, was unable to grow too hot in the Veſſels of its own accord, or to be enkindled more plentifully in the Heart, and then oftentimes became ſo dead, and wanting of Spirits, that being inſufficient for the continuing the Vital Lamp, it brought in Death. But ſometimes the Maſs of Blood being depraved, and made poor by this Diſeaſe, was able (tho hardly) to continue the half extinct Vital Fire, and to renew it by little and little, with Spirit and Vigor, in a long time; yet in the mean time, after the height of this Diſeaſe, when the blood being made more weak and impure, could not expel forth of doors this feaveriſh Matter, or aduſt recrements, by a critical motion, it often transferred it to the Brain; and therefore about the height of this Feaver, a torpor, and ſtupidity of Spirits, Sleepineſs, Vertigo, Tingling of the Ears, Tremblings, and convulſive motions, with a great oppreſſion of the whole Animal Faculty, were moſt often induced.

Men of a cold temperament, or in years, who were taken with this Diſeaſe, altho they were but little feaveriſh, were wont however to be in greater danger of Life; becauſe, in theſe, beſides the diſpoſition of the blood, not eaſily reducible, alſo what was gathered together in the fits, that was extraneous and not to be mixed, was hardly ſubdued, and difficultly ſifted forth of the Maſs of blood; wherefore, both the blood was ſtill more notably depraved in its Craſis, and in every Fit more infected by the impure mixture: Moreover, the nervous Liquor was greatly perverted from its due temper, and defiled moſt badly, by the aduſt recrements continually poured on the Brain. Therefore, when old men, melancholic, or otherwiſe ſickly perſons, fell into this Feaver, they became, preſently after its firſt Aſſault, ſtupified, and for the moſt part vertiginous: Tho in the Fits, the heat was not very ſharp and piercing, they were however very unquiet, and ſtill toſſing about, oftentimes they talked idly and at random; after a long burning, either no Sweat, or only partial, and often broke off, followed; whereby the Fit was not fully helped, but that in the whole intervals, the ſick were thirſty, and remained very ill, with a drineſs of the Mouth, a ſcurfineſs of the Tongue, and a ſuffuſion of a viſcous Filth. After ſome Fits, their ſtrength being exceedingly caſt down, they were wholly fixt to their Beds, or riſe only for a little while, could ſcarce ſtand or ſet a foot before another, to move from place to place, or able to walk: in the mean time, they laboured with a languiſhment, a difficult breathing, a nummedneſs of ſenſes, and a great debility of the whole nervous ſtock: The Urine in moſt was highly red, of a more deep colour, and of a thicker conſiſtency, than in a common Tertian: The Pulſe, whilſt the ſtrength was not wholly caſt down, for the moſt part was ſtrong and equal; afterwards, when the ſick became very languiſhing, it was weak and unequal, and oftentimes intermitting; to which alſo, conſtructures of the Tendons, and convulſive Motions in the Wriſts, being joyned, were for the moſt part Prognoſticks of Death. Thoſe who leiſurely being debilitated, declined towards Death, ſome little time before they died, lay for the moſt part without ſpeaking, or knowing thoſe about them, as it were ſtupid; and it rarely hapned in this Feaver, that any one about to die, was ſo perfect in their Memory and Intellect, as to diſpoſe of their Family-Affairs, or to take leave of their Friends. But it hapned to thoſe that eſcaped, from a deep languiſhment and almoſt deſperate condition, not quickly or ſuddenly to recover, from their manifeſt evil diſpoſition, but lying a long while wavering, ſtupified, and without ſtrength, that Nature at length, not but after a doubtful and difficult ſtrife, got indeed ſcarcely the better of the Diſeaſe, and then recovered ſtrength by degrees, and health lingringly and ſlowly.

If the Nature, and formal Reaſon of this Epidemical Feaver but now deſcribed, be demanded, we ſay, that this (as that of the former year) properly is an intermitting Feaver: for what commonly ſpread bore that figure; altho ſome here and there, more rarely, had it continual, which we ſhall by the way mention by and by. The Seed-plot or Seminary of this, need not be derived from the Air, being infected with any Infection, but rather its leading Cauſe is to be ſought, from the undue conſtitution of the Year, and from thence an indiſpoſition of our Blood being acquired. Becauſe, in the Spring and Autumn, intermitting Feavers

have

have yearly ſprung up and increaſed; to wit, for that our Blood, like to the Juice of Vegetables, is wont to be more lively moved than uſual, and to flower at thoſe times. Wherefore if the maſs of Blood, by reaſon of the foregoing ſeaſon, of the Summer or Winter, ſhould be altered from its due temperature, and ſhould contract either a ſharp or atrabilous diſpoſition, or of any other kind, its evil diſpoſitions begun before, are chiefly ripened about the Equinoxes; to wit, when the Blood more freely fermenting (if that it hath departed from its natural diſpoſition) doth not ſo eaſily ſanguifie, but that it will be apt to pervert the alible juice, poured to it, into an extraneous and feaveriſh matter. When therefore this year had not very much declined from a right Conſtitution (as not only the Dog-days going before, but) that the two Solſtices, and the Equinoxes, were wholly intemperate, it was no wonder if intermitting Feavers, more frequent than uſual, and thoſe noted with ſome unuſual Symptoms, did encreaſe about the Autumn. That therefore an intermitting Epidemical Feaver raged at this time, I judge it not to be attributed to the fault of the preſent Air, but to the Irregularites of the foregoing ſeaſon: yet from what Cauſes and Occaſions, ſome Symptoms proper to this Feaver, and diſtinct from the common Rule of intermitting Feavers, did ariſe, will be worth our Enquiry. I have already ſaid, that the proviſion, that made this Feaver ſo deadly, conſiſted in two things chiefly, *viz.* the temper of the Year, now extreamly cold, then upon it very hot, then that it had variouſly perverted the diſpoſition of our Blood, and had diſtempered the Pores of the Skin, with an undue Conſtitution. According to the Reaſons taken from either, I ſhall endeavour to explicate the Accidents of this Diſeaſe, and to aſſign the Cauſes of its Appearnce.

1. Firſt, We ſhall obſerve, that the Type of this Feaver was various, to wit, in ſome with a continual heat, in others with an eruption of Spots, but in moſt intermitting, and like a Tertian, and ſometimes (tho rarely) a Quotidian, repeating the Fits every day, or every other day: the Cauſe of this diverſity, we impute to the more ſtrong and potent morbific procatarxy of this Year, which produced in the Autumn, a more common intermitting Feaver than it was wont; wherefore, in ſome (perhaps indued with a more praved habit of Body) it ſtirred up Feavers ſomething malignant; and in whom it cauſed intermitting Feavers, according to the wonted manner of the Seaſon, it made them to be noted with a peculiar appearance of Symptoms.

2. Thoſe taken at this time with the Epidemical Feaver (whether it was Continual or intermitting) ſuffered preſently evil Diſtempers of the Head, *viz.* now they were wont to be infeſted with cruel Head-Ach, now with a Stupor, or too great Diſtraction of the Animal Spirits. The reaſon of this is, that the nervous Juice, as well as the Blood, by reaſon of the intemperance of the Year, was much altered from its due Craſis or Diſpoſition, *viz.* by nature ſweet and ſpirituous, and was become now heavy, and almoſt lifeleſs, now ſharp, and too much pungitive. Beſides, alſo, the Maſs it ſelf of the Blood very much contributed to this Evil; for whilſt it grew hot, the vaporous Effluvia. which ought to have been diſperſed outwardly, by reaſon of the Pores being ſhut up, were poured upon the Brain, and Membranes of the Head; and by reaſoe of this kind of ſtopping, impreſſed almoſt upon all, ſweat hardly, and not but partial, and often interrupted, ſucceded in the fits; hence alſo in the height of the Diſeaſe, a perfect Criſis, or ſpontaneous, rarely or never happened to cure it; but inſtead of this, if the buſineſs was committed to Nature, the aduſt Matter, or Recrements gathered together in the Blood, were transferred to the Head, and there raiſed up now the ſleepy Evil, now Phrenſies, and thoſe long and ſtubborn.

3, That the Fits ſometimes begun without cold or ſhivering, but with a troubleſome heat, and were prolonged with a difficult Sweat, partial, and often interrupted; then foraſmuch as the ſame being finiſhed, the ſick began again to wax hot, that the Fits were not finiſhed without a long evaporation of a dry breath; the cauſe was, the too ſharp and bilous diſpoſition of the Blood, whereby when it grew turgid, it was ſtuffed rather with aduſt Salt and Sulphur, than a ſerous Juice, and preſently conceived an enkindling, without any previous Flux of nitrous Matter; and therefore for want of Serum, and by reaſon of the Pores being ſhut up, its deflagration was continued for a long time, almoſt only with a dry Exhalation, and ſcarce at laſt ended in a remiſſion. And therefore the interſtitia of the Fits were moſt troubleſome with Heat and Thirſt, Head-Ach, Vertigo, and other Diſtempers; becauſe the feaveriſh Matter, being heaped up in the Blood, was not all diſperſed by the ſeveral Fits, but part of it being left after the Fit, as it were extraneous and not miſcible, induced almoſt a continual burning.

4. It was obſerved, that thoſe diſtempered with this Feaver, preſently loſt their ſtrength and fleſh, that after a fit or two, they panted for breath, and being very weak, were not able to ſtand or go, without being led; when it is an uſual thing in an intermitting Feaver that is common, for the Patient to be very lively and chearful between the Fits: the reaſon of the Difference is, becauſe in this Feaver, the Maſs of Blood is both more

more depraved by the impure mixture of the degenerate Juice, and especially, that the same is more perverted from its natural disposition, and therefore, when it boils up less out of the fits, it yet ferments not rightly and equally in the bosom of the Heart: wherefore, when by any more quick motion, or agitation of the Body, the Blood is carried more impetuously into the bosom of the Heart, because it is not there presently enkindled, it both leaps forth of doors, and by its stagnation, causes the oppression of the Heart, and great weakning of the Vital Spirits. By reason of this kind of dyscrasie of the Blood, to wit, whereby it is made more unfit for due Fermentation and enkindling in the Heart, also some Beasts, , and especially Horses, in the Spring-time, are made hard-breath'd, and very unapt to any rapid motion.

5. Lastly, We are to enquire, concerning this Feaver, wherefore it spread chiefly in Villages, in lesser Towns, and the Countrey, when Cities and greater Towns were less troubled with it. It might seem that this Distemper should be excited from Marshy Fogs, and other hurtful Vapors, plentifully heaped together in this or that Tract of the Air: but there is a better reason, for that the Inhabitants of these kind of places, being more exposed to the Spring-cold, and then to the Summer-heats, might have contracted a greater Dyscrasie of the Blood, and so a more apt disposition to this Feaver. For in truth, the Inhabitants of the Country could scarce go out of their houses, but they were exposed to the Sun's beams, or the fervor of the heated Air. Besides, Countrymen, Husbandmen, and such as were accustomed to Labors (among whom this Feaver chiefly raged) from their immoderate toil in the Sun or open Air, also using a bad and sharp Diet, sooner acquired an adust and torrid disposition of the blood, and so more apt for this Disease than Citizens and Townsmen, who lived an idle Life, and enjoyed wholesom food, and mostly continued within doors, and in refrigerating Shades. We may believe this Assertion, for that not only the Epidemical Feaver now raging, but also another of the Autumn before, excited by reason of the evil disposition of the blood increased chiefly among the Countrymen, and Inhabitants of the Countrey: but the popular Feaver, which arose in the middle of the Spring, depending chiefly upon transpiration being hindred, mostly infested Citizens and the Inhabitants of Towns; whilst Rustical men, that were wont, by Labour and Exercise, to procure a more free breathing forth, remained free.

The general Prognostication of this Disease seems only to ominate or foretel the like evil almost to follow this, as followed the Epidemical Feaver of the former Autumn, to wit, the Augury being taken rather from the intemperance of our Blood, than from the evil of the Air) not the Pest, but a Quartan Feaver might be feared to come upon it. As to the particular Indication, as Signs that promise Health or Death, I shall briefly mention them; and they chiefly respect the temper and government, either of the Blood, with the Vital Spirit, or else of the nervous Juice, with the Animal Spirit. If it be plainly indicated from the Pulse, Urine, from Actions less hurt, and the appearance of other Symptoms, that the Blood, as to its feaverish disposition, is not very much perverted from its natural temper; that in the fits it moderately burns forth; and in every Combat easily subdues the load of the feaverish matter, and wholly shakes it off from its company; that after some fits, the mass of Blood is somewhat restored towards its due Temper; that it perverts little the alible Juice, and sifts forth, with a more gentle rising up, what is extraneous and not mingleable, and that if in the mean time, the other spirituous Liquor, rightly inspires and waters the Brain and Nervous Bodies, that Sleep, Waking, Sensation and Motion are performed well, or at least indifferently, all good is to be hoped concerning the sick. But if it appears from the same Fountains of Indications, that the Blood hath acquired in this Feaver, a disposition far removed from the natural, if it perverts much of the alible Juice, and then from its extraneous and incongruous mixture, the Liquor of the Blood is greatly disturbed, and the Spirits driven into confusion; if in the fits, the Blood too strongly, and in a long time burns forth, yet doth not truly subdue the feaverish matter, or exclude the whole, but that by its impure mixture, it is still more and (in every feaverish fit) more infected, and the Spirits being continually consumed, it becomes poorer, we may pronounce the Life of the Patient to be in much danger. Besides these, if the Vices of the Nervous Juice happen, that being altered from its due temper, or being too dull, and as it were lifeless, little actuates the Brain and nervous Stock; or being above measure sharp, continually provokes the same into Convulsions and Distractions; and if besides the vaporous Effluvia's continually falling away from the Blood, or the adust recrements being wont to be sifted forth by a critical Sweat, should be transferred into the Head, and there induce Lethargic or Phrensical Distempers, the hopes of Health will be little, and we may fear a very deadly event.

Concerning the Cure of this Disease, the Intentions will come under three Considerations chiefly. First, a quick reduction (as much as may be) of the Blood and nervous Liquor, to their natural tempers, or at least a prevention of their too great depravation. Secondly, Concerning the right handling the fits of the sick, it ought to be procured, First, that less of the

the degenerate Juice may be gathered together for matter of the fit: 2ly, that what is gathered together, may be wholly diſperſed by every fit, that thereby the ſick may be better in the intervals: Thirdly, that the body being altered for the better, the fits may be inhibited by Anti-feaveriſh Remedies. The third intention reſpects the Symptoms chiefly urging, which ſhould be timely oppoſed, whereby Nature, being not hindred, may reduce whatſoever intemperance may be contained in the Viſcera or Veſſels, may ſubdue and ſift forth the extraneous Matter, and at length may recover a lively force, and priſtine vigor.

Firſt, therefore, for the reduction and emendation of the Blood and nervous Juice, diverſe manners of Evacuations are wont to be exhibited in this Diſeaſe, about the beginning of the Sickneſs, with good ſucceſs. It appears plainly from modern Practice, that Vomitories are of more noted Uſe in this Diſtemper, than in a common Tertian: wherefore in a robuſt body, and prone to vomit, about the beginning of the ſecond or third fit, it is convenient to give an Emetic Medecine. The operation of this ſeems to be very helpful in this Feaver, foraſmuch as it more plentifully evacuates the filth from the Ventricle, and the yellow Bile from the Choler-bearing Veſſels; and becauſe it copiouſly preſſes forth the ſerous Juice from the Emunctories of the Nervous Stock, planted about the Pancreas and Inteſtines, and by provoking them, draws it out. Wherefore we obſerve, that from a Vomit being taken, the ſick do find themſelves better about the Diſtempers of the Head. A Purge (to whom a Vomit is not convenient) may be ordered inſtead of it; the day following the fit, alſo tho an Emetick have been taken, it may be well permitted after a fit or two: But yet only with gentle and benign Phyſic, let it be performed, which will not diſturb or too much move the Blood. We were wont in theſe Feavers, letting alone Diagridium or any Aloetic Medecine, only to give an Infuſion or Powder of Senna, Rhabarb, and yellow Saunders, with Tartar and Salt of Wormwood, and to celebrate this kind of Purgation not very long after the beginning of the Diſeaſe, but at other times to keep the Belly ſoluble with the frequent Uſe of Clyſters. Frequent Experience hath ſufficiently taught, that Letting of Blood is highly profitable in this Diſeaſe; for when by reaſon of the Pores in every one, being more ſtrictly cloſed than uſual, the Blood growing hot, by the Feaver, wanted Ventilation, the Letting of Blood ſupplies the place of a more free breathing forth, and prevents the reſtrained *Effluvia* from ſo readily ſuffuſing themſelves on the Brain and nervous ſtock. But this Remedy is chiefly indicated from the very fervent Blood, and more hot temperament, nor ought to be indifferently uſed to old men, Phlegmatic, and other very weak Perſons, unleſs perhaps in a ſmall quantity, that the maſs of Blood may be ſomewhat eventilated, and that the removal of the feaveriſh Matter into the Brain, may be hindred. If it be convenient to open a Vein, let it be done about the beginning of the Feaver, or at leaſt before the fourth or fifth fit, *viz.* before the Blood is made very lifeleſs by the frequent deflagration, and rendred too impure by the confuſion of the aduſt matter; becauſe, if Phlebotomy be made uſe of, , whilſt the Blood is highly corrupted, the Vital Spirits, and by that means the ſtrength of the ſick are more debilitated, nor yet is there any thing taken away from the power of the Diſeaſe, or from its Cauſe. There remains another famous way of evacuation, in this Feaver, to wit, Veſicatory Plaiſters applied to various parts of the Body; theſe are commonly obſerved to be ſo helpful, that thoſe that abhor and diſlike very much ſuch a Remedy, by the example of others being the better for them, have admitted them. By what means they ſeparate the Cuticula from the Skin, and lift it up like a Bladder filled with Water, or whether they preſs forth this watery and limpid humor, out of the Arteries, or out of the Nerves, is not in this place to be enquired into; yet that they are profitably adminiſtred in this Diſeaſe, beſides Experience, Reaſon ſeems ſomething to perſwade, becauſe it in ſome manner compenſates the want of Tranſpiration, by the large profuſion of this kind of ſerous Latex: Moreover, this kind of Remedy, as it were, opens the ways and doors, by which both the Blood, and nervous Juice, may forthwith ſend forth by a proper purging, the extraneous matter, confuſed with them; wherefore, in the Plague and Malignant Diſtempers, Veſicatories are eſteemed very profitable. Alſo it appears by common obſervation, that in this and other Feavers, frequent at the ſame time, they did prevent the more grievous Diſtempers of the Head, and were wont to help them, if they were brought in before: wherefore, Epiſpatic Plaiſters may be applied about the beginning of the Diſeaſe, for preſervation ſake, to Phlegmatic Perſons, Elderly People, and men of a more cold Temper; and they are wont profitably to be adminiſtred to ſeveral others, labouring with a Vertigo, Stupefaction, or cruel Head-ach, for the Cure of the ſame Diſtempers. But in Conſtitutions very hot, where with the defect of the Serum, the Blood is too much burnt, and if thoſe ſick of the Feaver are obnoxious to Wakings, or a Phrenzy, with intolerable heat, Bliſters ſeem then to be of little uſe.

For the mending of the temper of the Blood, and alſo the tenor of the Viſcera, at vacant times, when there is leiſure from purging, attemperating Remedies have place, and Digeſtives, which fuſe the Liquor of the Blood, and ſeparate its fæculencies, and as it were by pre-

precipitating them, thruſt them towards the Emunctuaries: For theſe ſort of intentions, are wont to be given Juleps, and refrigerating Decoctions, ſharpned with Spirit of Vitriol, of Salt, Tamarinds, or with the Juice of Oranges or Limons; forms of which choice enough are commonly to be had. Alſo for this end, acetous, ſaline, and ſhelly Powders are uſed, to wit, prepared out of Tartar, Salnitre, the fixed Salt of Herbs, of burnt Harts-horn, alſo the Claws and Eyes of Crabs. As for example, Take of Cream of Tartar drams three, of Salt of Wormwood dram one and a half; the Doſe half a dram, in an opening Decoction, twice in a day out of the fit. Or take of Cream of Tartar dram one, of the Powder of Crabs Eyes dram one, of purified Nitre half a dram, mingle them; let them be taken after the ſame manner. Or take of Harts-horn burnt drams two, of the Spirit of Vitriol, what the Powder will drink up, the Doſe is one ſcruple, it is of excellent uſe when thoſe in Feavers are infeſted with Worms. Theſe kind of Remedies promote the ſecretion of the feaveriſh matter, and alſo reſtore the almoſt deſtroyed ferments of the Blood and Viſcera.

The ſecond intention, *viz.* concerning the right handling the fits, comprehends more. Firſt, There ought to be inſtituted a right order of Diet, whereby the more full heaping up of the degenerate Juice, for the matter of the fit, may be inhibited; wherefore, they are only to be fed with thin Aliments, and they muſt wholly abſtain from Fleſh (or Broth made of it) Eggs, ſtrong Drink, and all rich Meats and Food whatſoever, and be contented only with Barly Broth, or Grewel, Panada, Whey, and ſmall Beer; for that a more plentiful Aliment is not digeſted, or aſſimilated, but loads the Ventricle, and being powred into the Blood, diſturbs its Liquor, and compels it to grow impetuouſly hot. In the beginning of the Fit, and the time of its duration, no food ſhould be taken, unleſs for the allaying of thirſt; But for the tempering of heat and thirſt, Juleps, and cooling Decoctions, and eſpecially ſmall Beer: and Poſſet-drink ſhould be granted. Secondly, a little before the coming of the fit is expected, a gentle Medecine may be adminiſtred, which may drive away the fit by preventing it, or make it more eaſie by procuring a Sweat: for this uſe the Febrifuge Potion of the moſt Learned *Riverius* ſerves well, of the Water of Carduus, with Oyl of Sulphur, and Salt of Wormwood: Or take of Cream of Tartar, of Salt of Wormwood, and the ſeeds of Nettles, each one ſcruple, let it be given in the Decoction of the Roots of Sorrel; when the Feaver begins to decline, and that the fits are a little more remiſs, proper Febrifuges, applied outwardly, often inhibit the comings of the fits. Yet in the mean time, ſo long as the fits of the Feaver return, the ſick are to be handled ſo, that in every fit, the feaveriſh matter heaped in the Blood, may be throughly diſperſed; wherefore, when Sweat hardly ſucceeds, it ſhould be a little excited by temperate Medecines: Alſo the ſick ſhould be kept in bed, with a gentle breathing many hours, nor quickly permitted to riſe; for I have often obſerved, that ſick perſons have been ſtill worſe, becauſe impatient of their Bed, they have put on their cloaths before the vaporous Effluvia were ſufficiently exhaled.

Thirdly, As to the Symptoms and particular accidents, wherewith the ſick are wont to be infeſted in this Feaver, it is ſufficiently provided for moſt of them, with Remedies, in the method of Cure hitherto deſcribed; again, thirſt, the heat of the mouth, the ſcurfineſs of the tongue, vomiting, the looſneſs, fainting, ſwooning, may be referred hither, very well the preſcriptions commonly uſed in other Feavers: But what may ſeem to require in this Diſeaſe a peculiar Method of healing, are chiefly the Diſtempers of the Head and Brain, with the nervous Stock, which not being timely helped, may ſoon put the ſick into great danger of Life: As to the Indications of theſe kind of evils of the Head, they are of a twofold kind; if it appears from a Stupefaction or Torpor, a Sleepineſs, Vertigo, or Head-Ach, that the nervous Juice is become too dull, and as it were vapid or lifeleſs, and therefore doth not ſufficiently actuate the Brain and nervous Bodies; beſides the Remedies already delivered, and eſpecially Veſicatories, Medecines full of a volatile Salt do chiefly help: wherefore Spirits of Harts-horn, and of Blood, alſo the Salts of them, are of excellent uſe; but if the nervous Liquor be too ſharp, or the effluvia ſuffuſed from the æſtuating Blood, drive the Animal Spirits into confuſions or diſtractions, Remedies of the ſame ſort of volatile Salt are adminiſtred with ſucceſs in a little ſmaller quantity. Beſides, a frequent letting of Blood, and aſſwaging Medecines againſt its Fervor, help much; as Emulſions, Whey, and ſimple Water, plentifully drunk; Opiats are cautiouſly to be given in this Feaver, for the Phrenſie being often allayed by them, is changed into a Lethargy, or a deep Stupefaction.

FINIS.

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F I N I S.

THE AUTHORS EPISTLE

(To the *Treatise of Urines*)

TO

Dr. Bathurst.

Worthy Sir,

THE *Inspection of Urines, and from them, an investigation of directions concerning the Medicinal Practice, began to be esteemed among the Ancients, even from the first beginning of Medicine: for from hence for the making of judgments concerning the Sick, and for the chusing the most fit times for Curing, the great* Hippocrates *hath chiefly taken both his prænotions, and his precepts, so that that famous and to this day approved statute of old Medicine, to wit,* τὲ πέπονε φαρμακεύειν, *to compose Medicine according to digestions, cannot be observed without rightly consulting the Urinal. Also this seems consonant to common reason, that for as much as we cannot search into the most intimate parts of the Sick Body, as it were a Vessel shut up, judgment is sought from the infused liquor, washing all its parts, and taking from many some little parcels. For neither more certainly do the acidulous or Spaw-waters, shew the nature of the hidden Mine, through which they are strained, than Urines give testifications of the divers manners of dyscrasies of our Bodies, and their habitudes. Wherefore the Contemplation of this Excrement, (as vile as it is) hath grown to a Science, and hath exercised the ingenuities of the most excellent Physicians, both Ancient and Modern. Concerning this thing there are many Books extant, writ with great diligence; in which are rehearsed the great differences of Urines, varieties of Colours, and diversities of Consistence, and their Contents exactly described, and distinct precepts are delivered for every excretion of them: Which indeed are esteemed by some of so great certitude, that from the inspection of the water, a signification is sought of any Disease, or of the part affected; yea of every accident concerning the sick. But in this the Common People are egregiously deceived, and still pertinaciously will be deceived, whilst they imagine the knowledge of every Disease, and the prognostication of it cannot be found out, but by inspecting the Urine; and esteem a Physician of little worth unless he undertakes to divine from the Urinal as from a Magical Glass. But indeed, as to what belongs to the Precepts, and Rules whereon the reason of Judgment by Urine doth depend, there are many collected by diligent observation, that are extant, and from thence establish'd with good Reason and Judgment: yet for as much as the signification of Urines is by some too largely extended to particular Cases, very many uncertain things interwoven, and some obnoxious to deceit, and others plainly false; therefore who shall confidently pronounce concerning the business of the Sick, by the judgment only of the Water, deserves rather the name of a jugling Quack, than of a Physician.*

But this Doctrine concerning Urines, abounds so ordinarily with errors, that the observations which belong to its practice, are either wrongfully made, or not well reduced into method. We may lawfully suspect that the observations are not rightly made, because perhaps from one or two particular cases, oftentimes a general rule is established. For Example sake, because some Hydropical people render a thin and watery Urine, therefore it is affirmed, such sort of Urines necessarily denote a Dropsie, when also in some other Diseases such like Urines are made; and sometimes in the Dropsie, the Urines are thick, and full of redness. Also as it is most commonly received, that Urines on which a cream doth swim (as on water that hath Tartar boyled in it) doth denote a Consumption, which is most uncertain, because this sign is more proper and familiar to Hypochondriacks than to Consumptive people: And how many dye of Consumptions without this? Besides, what is generally asserted, to wit, that in all diseases whatsoever, Nature doth make known the Disease by the Urine, is altogether false; because sometimes sick people make their Urine like healthful people; and sometimes those who are very well in health, by reason of some accident (perhaps from the meats eaten) have suspected Urine, varying from the natural state or condition. As to what belongs to the method, or doctrine delivered by most, concerning Urines, they seem to be altogether Empirical, and nothing rational: for the naked differences of Urines are rehearsed, and are wont to be distinguished according to their colour, consistency and contents: thence are opposed to the several species of these pathologick significations, collected only from more rare observations; when in the mean time, the causes of the appearances, nor of the preternatural alterations in the Urines, are not assigned, as they ought to be; nor is the signification of the Urines applyed to the Causes of Diseases, but only to the Disease or Symptom; and therefore it is most often deceitful, and uncertain; because the same morbifick Cause, and signification of the same Urine, may in like manner mediately respect at once divers Diseases, a Symptoms. As for Example, a thin and watry Urine, most often immediately denotes Indigestion, or a defect of Concoction in the Viscera: nevertheless, by reason of that condition of Crudity, the Green-sickness in Virgins, sometimes the Dropsie, or the white watery phlegmacy, sometimes Head-aches, and many other diseases arise. But the task which you have required of me, Worthy Sir, to wit, that the notions which in times past we have discoursed together, and conceived concerning Urines, as it were collected notes, and what have since fallen under my own knowledge, by my proper study and observation, concerning this thing, should be fram'd into a little Treatise, and that I should write a plain and new method of Urinoscopie. I confess the work greater than can well be performed by our own proper strength: however, I have resolved as much as I am able, to obey you therein. But that a Doctrine or Method concerning Urines may be instituted, beyond the vulgar and plainly Empirical manner of Philosophising, there shall be these two heads of our Discourse. To wit, First that the Anatomy of Urine may be delivered, of what elements and parts it consists; and also its genesis in our Body; to wit, by what Concoction this kind of Liquor is made, and then by what secretion of some Particles from others. Secondly, That the inspection of Urines in the Urinal may be truly unfolded, and what may be the Rules, and the Certitude of Uromancy, or divination of the Urine.

OF

OF URINES.

CHAP. I.

Of the Elements and chief Accidents of Urine.

WHEN the Liquor of the Urine, being either freſh rendred from the body, or putrified by a long digeſtion, is expoſed to a ſpagirick Analyſis, it is wont to be reſolved into theſe parts or principles: In the Diſtilling, Firſt, aſcends whatever of a vinous ſpirit is in it, diluted with water; but yet in ſo very ſmall quantity, that it is not eaſily to be perceived by the taſte it ſelf. To this follows a watry liquor, large enough in proportion, with which are mixed ſome more looſe particles of Salt, and Sulphur eſpecially. Thirdly, There is ſtilled forth a very penetrative water; which is commonly called the ſpirit of Urine, but in truth almoſt without any vinous ſpirit, and is chiefly phlegm highly ſharpned with Salt, and therefore it aſcends laſt, as in the diſtillation of Vinegar: but foraſmuch as the ſalt of Urine is volatile, but that of Vinegar only in the Flux; therefore the liquor ſtilled forth, which is greatly impregnated with its particles, is very acide: That which is imbued with the ſaline Particles of the other, is exceeding ſharp and pricking. It is a ſign that this kind of Spirit of Urine (as it is commonly known) ows its ſharpneſs chiefly to the Salt, becauſe, though it be moſt ſubtil it will not take fire, but being put to it extinguiſhes it. After the humidity is wholly exhal'd, another portion of Salt remains with the Earth of the cucurbit; to which if a more hot fire be made, that Salt will be ſublimed into the Alembick, and the earthy feces only remain. This kind of Anatomy of Urine plainly ſhows, that the Elements of which its liquor is compoſed, are a great deal of Water and Salt, and a little of Sulphur and Earth, and a very little of Spirit.

The ſaltneſs in Urines is perceived by the taſte and touch; it comes neareſt to a Nitrous ſalt in ſavour: It is drawn indeed from ſaline Particles of things eaten, which being more plentifully exalted by the concoction in the Bowels, and the circulation in the Veſſels, for the moſt part go into a Volatile Salt. That is truly Salt and Spirit, by reaſon of the long accompanying of either together, are gathered into a moſt ſtrict bond; and therefore it happens, that the Salt it ſelf otherways fixed, is carried up on high, and rendred able for motion, as it were by the wings of the other. Urines contain in them more or leſs of Salt, according to the diſpoſition of our body, and have it either volatile or fixed, which are therefore of a divers colour and conſiſtency.

That there is Sulphur contained in Urines, their quickly putrifying, and ſtink, ſufficiently teſtifie: it ariſes from the fat and ſulphureous Particles of Meats, in the concoction being moſt minutely broken, and boyl'd with the ſerum and ſalt; ſo as alſo there is leſs plenty of Spirit in it, than is in Blood, Soot, or the Horns of Animals: wherefore in the diſtillation of Urine, there aſcends nothing almoſt of an oylie form or fat. But indeed, whilſt the blood is circulated in the Veſſels, the ſpirituous and ſulphureous little bodies, which fall away from it, do for the moſt part evaporate out of dores; in the mean time, the ſaline recrements, and the watery, chiefly conſtitute the Piſs: nevertheleſs, Urines do always participate a little of ſulphur, but its quantity and proportion, is diverſly altered according to the various degrees of Concoction and Crudity, and thence alſo the colour and conſiſtence receive many mutations in Urines.

That there is but a very little of vinous ſpirit in Urines, the defect of it in the liquor diſtilled forth, alſo the ſoon putrifying of the Stale do teſtifie: but that there is ſome, the inteſtine motion of the Particles in the Urine doth argue, to wit, the departure of the thin from the thick, and the ſpontaneous ſeparation of ſome parts from others, and a collection of them into a ſettlement: beſides, the ſaline Particles (for that they are made volatile) are married to ſpirituals, and ſo they are of a more ready motion, and energy; yet according to the divers plenty of Spirits in Urines, and their power, there ariſe divers manners of hypoſtaſes and ſettlements; alſo the Urines themſelves, ſooner or ſlower putrify.

The watry part of the Urine far exceeds the reſt in quantity, and is greater than they by almoſt a ſixth part: it is not ſo ſimply drawn forth by diſtillation, but that ſome Particles of Salt and Sulphur (foraſmuch as they are volatile) aſcend with it, and impart to the water an ingrateful ſtink: the potulent matter, copiouſly taken with aliments, affords an original to this; which of what kind ſoever it be, before it is changed into Urine, lays aſide its proper qualities, and acquires others; for truly, from the aſſumed liquor, there is nothing ſincere almoſt left in the Piſs, beſides meer humidity.

That there is earth, and muddy feces to be had in Urines, its diſtillation, or evaporation ſufficiently declares: for when the reſt of the parts are exhaled, the earth as it were a *caput mortuum*, will remain in a moderate quantity in the bottom: Foraſmuch as in the nouriſhing juice, there is required ſomething ſolid beſides the active principles of ſalt, ſulphur and ſpirit, whence the bulk and magnitude of the body grows; the recrements of this, *viz.* the earthy feculencies, are plentifully diſſolved in the ſerum, and contribute to it a thick conſiſtence and contents: but theſe ſhew themſelves after a divers manner, according to the ſtate of Concoction and Crudity.

Theſe are the principles which conſtitute the body of the Urine, alſo into which it is eaſily reſolved, by a Chymical Analyſis: out of the divers changes, and various contemperation of theſe, the other accidents of Urine ariſe, *viz.* Quantity, Colour, Conſiſtency, and Contents, which are as to the ſenſe the moſt notable concerning it, and the chief objects of the rendered Urine: For when there is nothing beheld beſides in the Piſs, they conſtitute theſe firſt *Phænomena*, in which rightly ſolved, conſiſts the whole Hypotheſis of this Science: Wherefore we ſhall ſpeak in the next place, concerning theſe, and firſt of the Urine of healthful People, what its quantity may be, how coloured, with what conſiſtence and contents indued; and together ſhall be unfolded, out of what mixture of Elements, and by what Concoction in the *Viſcera*, and Veſſels, each of theſe depend. Secondly, ſhall be ſhewn how many ways the Urines of Sick People vary from the ſquare or Rule of this of the Sound: and I ſhall endeavour to aſſign, for the ſeveral differences of them, proper Cauſes of their alterations; and theſe ſhall conclude our firſt propoſition in this diſcourſe, *viz.* the Anatomy of Urine.

CHAP. II.

Of the Quantity and Colour of the Urines of Sound People.

THE Quantity of the Urine in Sound People, ought to be a little leſs than the humor, or liquid ſubſtance daily taken, for moiſt and drinkable things daily taken, are the matter it ſelf of which Urines are firſt made: But theſe (hunger and thirſt urging) are more plentifully required, both that they may ſufficiently waſh the maſs of the Chyme, by which means it may rightly ferment in the *Viſcera*; and that they may ſerve for a Vehicle, both to the Chyme, whereby it may be conveyed to the bloody Maſs, and to the Blood it ſelf, that it might be circulated in the Veſſels without thickening; and to the Nervous Juice, whereby it might actuate and water the Organs of Senſe and Motion: when the ſerous *Latex* by this means hath beſtowed whatever it hath almoſt of Spirit and Sulphur, for nouriſhment, Heat and Motion, it gives way to a new nutritious humour; and it ſelf as unprofitable, being ſecluded from the Blood, by the help of the Reins is ſent away. The nouriſhing liquor, which will at laſt be changed into Urine, of its own nature is divers, *viz.* now watry, now impregnated with Spirit, now with Salt and Sulphur, and according to the various forces of this or that Element in it, Urines are wont to be ſomewhat altered: However all liquors taken in at the mouth, do not paſs thorow our body whole and untouched; but that they undergo mutations in various parts, and loſe a little portion of their quantity, before they are made into Urine: For the *Latex* or Humour to be converted into Urine, is firſt of all received into the Ventricle, (for I aſſent not to *Reuſner*, who affirms the ſame falling for the moſt part on the Lungs, to cauſe the more quick making water after drinking) whilſt that it ſtays in the *Ventricle*, it is there boyled; alſo impregnated with Salt and Sulphur of its own, or from more ſolid Aliments diſſolved: then very much of it is confuſed in the blood, with the nouriſhable juice, which when it is a long time circulated, from thence receives a farther tincture of Salt and Sulphur, according to the various temper of the blood, and its inkindling in the Heart: Hence ſome portion of it is derived with the Animal Spirit, to the Brain and nervous ſtock; and afterwards from thence, being made lifeleſs and weak, is laſtly reduced into the boſom of the blood; after that it hath beſtowed on the Blood and Nervous Juice, whatever of generous or noble is conteined in the Serum, alſo no ſmall quantity is conſumed by ſweat and the other emunctories; what remains, whilſt that the Blood continually waſhes the Reins, a precipitation being made, either by a ſtraining or force of a certain ferment, it is there ſeparated from the Blood, and from thence paſſes thorow the Ureters into the Bladder, and ſo is carried forth of doors.

From

From the origine and luſtration of the *Serous Latex*, but now deſcribed, it plainly appears, that the Urine ought to anſwer to the quantity of the liquids taken, in ſomewhat a leſſer proportion, perhaps under a third part; which plainly ſhews the diſpoſition and ſtrength of the *Viſcera* ſerving for Concoction, as alſo the temper and diſtribution of the blood it ſelf, and after a ſort, of the nervous juice; moreover it carries with it ſigns of the affections of the Urinary paſſages. The quantity of the Urine declines often from this Rule, ſo that ſometimes it ſuperabounds, alſo ſometimes is deficient: and either for a ſhort time, may conſiſt with a diſpoſition not much unhealthful; but if theſe kind of diſtempers continue long, they argue a ſickly condition. Concerning theſe we ſhall ſpeak among the appearances of the Urine in a diſeaſed condition of the Body; we ſhall now next conſider the colour of a ſound Urine.

The Urine of Sound People, which is rendred after Concoction is finiſhed in the Body, is of a Citron colour, like Lye a little boyled: which without doubt proceeds from the Salt and Sulphur of the nutritious juice, and the Blood, diſſolved in the Concoction, and boyled in the Serum. This colour doth not ariſe only from Salt (as ſome would have it) becauſe the Liquor impregnated with Salt, unleſs it be evaporated to a certain thickneſs, will not grow yellowiſh: Alſo Salt of Tartar, being diſſolved by melting, continues ſtill clear. What may be objected concerning the Lye of Aſhes, I ſay, there the whole Sulphur is not conſumed by burning, but the Citron colour ariſes from ſome ſaline Particles, and others Sulphureous burnt, and ſticking together in the Aſhes, and then infuſed or boyled in the liquor. Neither doth the Urine of ſound People acquire this ſame colour from Sulphur only, becauſe Sulphur in a watry Menſtruum, is not diſſolved unleſs by the addition of Salt, nor will it give any tincture of it ſelf; but if Salt of Tartar and common Sulphur be digeſted together in water, or if Antimony be boyled in a ſaline Menſtruum, both liquors will by that means grow yellow like Urine; after the like manner, the ſaline and ſulphureous Particles of Aliments, being incocted and moſt minutely broken in the Serum, by a Digeſtion in the *Ventricle* and *Inteſtines*, and by a Circulation with the Blood in the *Arteries* and *Veins*, impart to it a Citron Colour.

This kind of diſſolution of Salt and Sulphur, by whoſe means the Urines are made of a Citron Colour, is firſt begun in the Bowels; and afterwards perfected in the Veſſels, and very much depends upon the Concoction performed in the *Ventricle* and the *Inteſtines*: For here, by the help of heat and of ferments, the Aliments taken are chiefly ſubdued; the bond of mixture being broken, the ſaline and ſulphureous Particles being moſt ſmally broken, and made ſmall, go into a milkie Cream, and from thence the Serum remaining after that Concoction and Diſtribution of that milkie juice, becomes of a Citron colour: after the ſame manner, as when the Salt of Tartar and common Sulphur being diſſolved together, and mixed with ſome acide thing, indue a milkie colour; then the contents being ſeparated by ſetling, the remaining liquor grows yellow like Lye. If that the aliments, by reaſon of an evil diſpoſition of the *Ventricle*, are not rightly digeſted in the firſt Concoction, as in the *Longing Diſeaſe* or *Pica*, the *Dropſie*, and other ill diſpoſitions of the Bowels, uſually comes to paſs, the Urine alſo is rendred crude, clear, and almoſt inſipid, like Fountain water; but if by reaſon of the ferments of the *Viſcera* being more than duly exalted, or otherways depraved as in the *Scurvy*, *Hypochondriac* diſtemper, or *Feveriſh* intemperance, the Particles of things eaten are too much diſſolved in the firſt Region, by that meanes Urines are rendred red and thick.

The *Serum*, as hath but now been ſaid, being imbued with a Lixivial Tincture in the firſt Concoction, and confuſed in the Blood, ſo long as it is circulated with it, it is yet further concocted, and acquires a more deep colour; for the particles of the Blood being roaſted and ſcorched, although for the moſt part they are laid aſide into the Gall bag, yet being in a manner boyled in the Serous *Latex*, they heighten its colour; hence the Concoction being ended, the Urine which is firſt made, is more pale, and that which is laſt, more red. That which is made after long faſting, is yet more high Coloured. Where the Blood is more cold, as in Cachectical people, the colour of the Urine is made leſs; where the Blood grows raging with a feveriſh Heat, and is roaſted, the Urine grows highly red.

Concerning the Urines of ſound people, it is worth obſervation, that which is made after plentiful Drinking, hath no tincture, but is pale like water; of which we ſhall enquire, by what means the Serous *Latex* ſo ſuddenly ſlides away out of the *Ventricle*, (contrary to what is vulgarly believed) and paſſing thorow all the Chyliferous paſſages, then the Veins, Arteries, the boſom of the Heart it ſelf, and the turnings and windings of the Veins and Ureters, is put forth of the Body within ſo ſhort a ſpace: moreover, how it comes that the Urine being ſo precipitately made, contrary to moſt other things, is not only changed into no Colour in its paſſage, but it alſo loſes its own proper colour: For as the Proverb is, *Our Drink goes thick in, and comes forth thin:* or *We Drink thick Beer, and Piſs clear.*

Concerning this we ſay, that beſides the long wandring of the nouriſhing juice, to wit, whereby, after ſome ſtay in the *Ventricle*, it ſlides into the *Inteſtines*, and from thence thorow the milkie Veſſels into new paſſages, and thence is carried into the Veins (which carrying about cannot be quickly performed) it is moſt likely, that there is another nearer paſſage of the ſame nutritious Juice, whereby indeed it may be conveyed immediately, and without delay, to the Maſs of Blood, and perhaps to the nervous Liquor; and therefore, after faſting, there immediately follows a moſt quick refection of ſtrength and ſpirits, after Eating, and eſpecially after Drinking; which indeed cannot be thought to be made by the Spirits and Vapours; alſo from ſuch drinking the Urine is preſently rendred, and indeed ſooner than it can be

be thought, that the Maſs of the Chyle can be ſent out of the boſom of the Ventricle; wherefore, it is not improbable, that when the Alimentous Liquor is entred the Ventricle, preſently the more thin portion of it, which conſiſts chiefly of Spirit and Water, is imbibed by its Spongeous Membranes; and from thence being inſtilled into the little mouths of the Veins, it is preſently confounded with the Blood flowing back towards the Heart. For of this opinion (though not very ſtubbornly) I always was, *That the Chyme was in ſome meaſure immediately derived from the Ventricle, and Inteſtines by the branches of the Vena Porta, into the Maſs of Blood*; and as the milkie paſſages carry it about by a long compaſs, whereby it may be inſtilled into the deſcending Trunk of the *Vena cava*; ſo that it may be carried in a more near way, *viz.* into the aſcending Trunk of the ſame, by theſe Veſſels; foraſmuch as the Blood being made poorer in its Circulation, returning from either part, before it had entred the heart, it ought to be refreſhed with a new juice, whereby it might more lively ferment in the boſom of the heart; but foraſmuch as the much greater part of the Blood is carried upwards, ſurely it may ſeem agreeable to truth, that at leaſt ſome portion of the nouriſhing Juice may be added to this, as it were a ſuſtenance, it being before burnt forth, and almoſt lifeleſs, for its new inkindling in the heart. The Arguments that ſeem to perſwade to this, not of light moment, I could here heap together, but I ſhould ſo divert far from our propoſition: wherefore, that we ſo ſuddenly make a wateriſh Urine after Drinking, I eſteem to be done after a manner as was but now ſaid; therefore the Liquor that is carried ſo haſtily from the Aliments to the Maſs of Blood, paſſing thorow the ſo narrow windings (as are the Membranes of the *Viſcera*) being drawn as it were by diſtillation, the more thick matter being rejected, conſiſts almoſt only of Water and Spirit; with which indeed it refreſhes the vital Spirits, and dilutes the Blood; about which task, when the ſpirituous part is conſumed, the watry Latex, becauſe of its plenty, being heavy and troubleſome, is continually ſent away by the Reins; and when it comes from the Ventricle, not yet imbued with Salt and Sulphur, nor is long circulated with the Blood, that it might by that means acquire a lixivial tincture, it is rendred thin and clear.

CHAP. III.

Of the Conſiſtency and Contents of the Urine of Sound People.

SO much for the Quantity and Colour of Urines, which proceed from a ſound Body; but as to what belongs to the Contents, we muſt know, that there ought to be nothing beſides the Hypoſtaſis in a ſound Urine; but what this is, and by what means it ſinks down, remains to be unfolded in the next place.

So long as the Maſs of Blood, being fuſed with the ſerous and nouriſhable humour, is continually circulated in the Veſſels, from it a certain nutritious juice is made, by a perpetual digeſtion, which being put continually to the ſolid parts, goes into nouriſhment: This firſt of all is digeſted into a glutinous humour, like the white of an Egg, afterwards into thin Filaments or Rags, which being interwoven in the Pores, and little ſpaces of the ſolid parts, ſtill afford to them an increaſe of new ſubſtance; but whilſt the Serum being mixed with the Blood, waſhes all the Regions of the Body, it ſucks up into it ſelf a certain ſuperfluous portion of this laſt Aliment, to be lay'd on the ſolid parts, and carries it forth of dores with it ſelf; and this it is that conſtitutes the Hypoſtaſis or ſettlement in Urines; wherefore ſo long as this is preſent, it indicates how far Concoction and Nutrition in ſome meaſure is performed, and is accounted a laudable ſign; its abſence ſhews Crudity and Cachectical people, or a *Dyſcraſie* in Fevers; it conſiſting of ſmall Threads or Filaments, is diſperſed at firſt thorow the whole body of the Urine, and then is collected into a little Cloud, by this means. Theſe Filaments or Threads, are long, and ſmooth, alſo indued with ſome ſharpneſſes like Brier-pricks, that from thence being ſhaken about, they eaſily lay hold of one onother, and are faſtned together; even as if unto an Urinal full of water, you ſhould caſt many Hairs, and then by ſhaking about the Veſſel, the hairs at firſt ſwimming diſperſedly, in a little time would lay hold on one another, and be collected into a little bundle; after the ſame manner (as it ſeems) the little threads which conſtitute the Hypoſtaſis or ſettlement being variouſly here and there agitated by the Colour and Spirits implanted in the Urine, intangle and thruſt upon one another, until they gather into one little Cloud by the mutual knitting of all together; and becauſe theſe Filaments are compacted, and more ſolid than the other Contents of the Urine, they ſink towards the bottom with their weight.

It is very likely, that theſe kind of Filaments, make the Hypoſtaſis in the Urines of Sound People, for that the Blood being well conſtituted, and diſpoſed to nouriſhment, is very much ſtuffed with Fibres, or white Filaments: becauſe, when a Vein is opened, if the Blood let out be received into warm water, it will be conſpicuous to any one; for the red thick ſubſtance being diluted with the liquor, theſe

ſmooth

ſmooth and white threads ſwim in the water; wherefore it ſeems, that ſome of theſe thin or ſlender rags, being ſnatch'd away with the ſerous juice, are the matter of this cloud ſubſiding in the Urine; wherefore in Cachectical people, by reaſon of Crudity, the Blood being very wateriſh, and unfit for nouriſhment, is deſtitute of theſe well labour'd Fibrils; alſo in *Dyſcraſies*, when the nutritious humour, the Blood being too much ſcorched, is not rightly concocted into theſe kind of Filaments, the Hypoſtaſis in Urines is either wholly wanting, or is very confuſed and diſturbed.

It is ſaid to be a good and laudable Hypoſtaſis, which is of a whitiſh colour, of a round and equal figure, and ſinks towards the bottom, to which are required, Firſt, that that laſt Aliment be rightly labour'd, whereby the Filaments may become white, ſmooth and ſolid, like to ſlender Fibres. Secondly, That the Urine be ſufficiently ſtrong in ſpirits, which (as is beheld in the growing hot of Muſt, or new Wine) may agitate, and compel here and there all parts. Thirdly, that the liquor be not too thick, nor that its Pores be firſt poſſeſſed by ſtrange bodies, whereby the motion of the contents may be hindred, but that a ſufficient ſpace may be left, for the free agitating and toſſing about theſe kind of Particles.

If the ſubſtance be red, it is a ſign that that laſt Aliment is ſcorched and burnt, with too much heat; wherefore ſuch a ſediment, for the moſt part is in the beginning of a Feavour, ſo long as the Coction in the Viſcera and Veſſels, is not wholly perverted; if the Hypoſtaſis be broken and unequal, it is a ſign that the nutriment deſtinated for the ſolid parts, is not rightly and equally concocted, and that its Particles are not homogene, and alike in every part: wherefore the Filaments do not cohere together, but theſe with thoſe, and they with others, are entangled apart; hence ſome more thick deſcend towards the bottom, and others more light ſwim upon the top. When the Hypoſtaſis does not wholly ſink down, but hangs all of it, either in the middle or upper Region, that happens, becauſe that thoſe Filaments are not perfectly laboured, nor ſolid and compact, but more rare and ſpungy, or becauſe the liquor is thicker, and more impregnate with Salt and Sulphur, and therefore like Lie it ſuſtains ſome weights, which otherwiſe would ſink to the bottom. Sometimes the Hypoſtaſis is wholly wanting, in ſound people, after long faſting, immoderate labours, or copious ſweating, the matter being wholly conſumed into nutriment, or evaporated by ſweat; in Fevers, by reaſon of the very depraved condition of the Blood; alſo in the *Pica*, *Cachexie*, and other Diſtempers of that kind, by reaſon of the great Crudity.

Concerning the conſiſtency of the Urine in ſound people, there is not much worthy conſideration to be met with: It is wont to be of that ſort, as midling Beer is, being purified by a long Fermentation; or Lye a little boyled, *viz.* the watry liquor of the Urine, ought to include in its Pores and paſſages, a great many Particles of Salt and Sulphur, moſt ſmally broken and diſſolved; and beſides a little of earth, divided very exceeding ſmall, and diſperſed thorow the whole body of the Piſs, if the conſiſtence be thinner than it ought, as it is in clear, or limpid Urines, and watry, it is a ſign of indigeſtion and crudity; that the Aliments are not fully overcome, and concocted; but if the Urine be thicker, and cloſer than it ought, it is a ſign, that the body of the liquor, is filled with preternatural Contents. But of theſe elſewhere, when we ſhall ſpeak of the Urines of the ſick.

Thus far of Urine, foraſmuch as it is an Excrement, and ſign of Concoction in a ſound body (truly performed in the Viſcera and in the Veſſels) the quantity or bulk of which is to be determined by the potulent matter; the colour Citron, from the diſſolved Salt and Sulphur, and boyled in the Serum; the Hypoſtaſis or Contents depend upon the Filaments, elaboured in the Blood, for the nouriſhment of the ſolid parts; the conſiſtency on the Salt and Sulphur, together with the Particles of Earth, filling the Pores and paſſages of the ſerous liquor. It next remains, that we treat of the Urines of Sick People: in which alſo, the Quantity, Colour, Contents, Conſiſtence, and ſome accidents beſides, offer themſelves to conſideration.

CHAP.

CHAP. IV.

Of the Quantity and Colour in Urines of ſick People.

IN a Morbous proviſion of Bodies, or Sickly eſtate, the quantity of the Urine does not exactly quadrate with the proportion of the liquid things taken; for ſometimes it wants of its due meaſure, and ſometimes exceeds it. When the Urine is much leſs than the drinkable things taken, the reaſon is, becauſe the watry Latex either ſtays ſomewhere in the Body, or is diverted by ſome other way of Excretion, than by Urine: if it remains within; First, it is either heaped up about the Viſcera, and their Cavities, and ſo is ſtay'd now in the Ventricle, more than it ought to do, and induces by the diſtention of it, troubles, with ſpitting; but more often, it is laid up in the hollowneſs of the Abdomen, and ſometimes of the Thorax and head, and there is wont to cauſe Hydropic Diſeaſes, Or, Secondly, the Serum ſtagnates in the Veſſels, and ſo increaſes the bulk of the Blood, and Nervous Liquor, and notably perverts its motion; whence Catarrhs, Rheumatick diſtempers, and often Palſies and Convulſions are cauſed. Or thirdly, this watry humour is fixed in the habit of the body, and ſo creates a ſwelling up of the whole body, or of ſome parts. Or fourthly and laſtly, it is obſtructed in the urinary paſſages, by the Stone, or thick matter, as it were a dam oppoſing it; and cauſes in thoſe parts pains and Convulſions, and a fulneſs of the Serum in the whole body. When the ſerous water is other ways beſtowed, the Patients are for the moſt part prone to frequent and troubleſome Sweats, or almoſt to a continual Looſneſs.

The diſtempers therefore which the ſmall quantity of the Urine is wont to indicate, are ſometimes the ſwelling up of ſome of the Viſcera, and a heaping up of water in them, ſometimes Catarrhal diſtempers, ſometimes evil diſpoſitions of the nervous ſtock: ſometimes an Anaſarca and watry Tumors: and ſometimes the ſtony diſpoſition of the Reins and Bladder. And ſometimes alſo the diminution of the *Urine* is the effect and ſign of ſome other preternatural evacuation, *viz.* an immoderate excretion of Siveat, Lask, or ſome other thing. To deſcribe here exactly all the ſubſiſtences of the ſerous Latex, either in the body, or the cauſes of it other ways excreted, and the manner of doing it, were to transfer hither almoſt the whole matter of Pathology; for many and divers are the occaſions and circumſtances, whereupon this Serum is heaped up in this or that part, and ſubſiſting in the body, diminiſhes the quantity of the Urine; but for the moſt part the principal and moſt frequent cauſe of this conſiſts not ſo much in the fault of the Liver, Spleen, or Reins, as of the blood it ſelf: to wit, a copious and free making of Urine, as alſo its ſtay in the body, and only made in little quantity, depends chiefly on the temper of the blood, and either on its kindling, or fermentation in the heart: for if the blood be ſtrong in rightly exalted principles, (*viz.* Spirit, Sulphur, and Salt) it grows very hot in the Veſſels, and ſo the frame of the liquor being looſe enough, it is duly kindled by the ferment of the heart; and almoſt ſpiritualizes the whole, paſſes through all parts with heat and a rapid motion, without ſtopping; and whatſoever is ſuperfluous and volatile, evaporates out of doors: and whilſt the blood is rarified, and boiling with heat, paſſes through the Reins; what is ſerous is eaſily ſeparated, either by the ſtrainer of the Reins only, or (which is moſt likely) by a coagulation, and is as it were precipitated from the remaining maſs of the blood. The ſame thing almoſt happens after this manner to the blood, as we may obſerve in Milk, *viz.* whilſt it is warmed, and grows hot, it moſt eaſily goes into parts, and its Serum is moſt eaſily ſeparated by the leaſt drop of Runnet, or Coagulum put into it: but if you pour much more ſtrong and ſour ferment into it, when it is cold, a precipitation will hardly follow; ſo if the blood becomes through an evil conſtitution, or ill manner of living, more cool and watry, that being leſs enduced with active Elements, it grows but dully hot, and is but little kindled in the heart, it is circulated very ſlowly and difficultly in the Veſſels; paſſing through the Pores and paſſages of the Viſcera, it cleaves a little to them, and leaves ſomething behind it; whence are gotten every where Obſtructions and Tumors; alſo the blood by this means becoming viſcous and cool, and ſo unfit for precipitation, or percolation lays aſide leſs readily its excrements in the Reins; but leaves them every where in the body, becauſe it hardly, and not without the reſidence of a certain humor, is circulated. Wherefore in this ſtate, thoſe things that move the blood very much, as exerciſe and a more quick motion; or alſo ſuch as may fuſe it, as it were with a Coagulum or Runnet, as are ſharp things, and preparations of Salts, will more freely provoke Urine.

It ſometimes happens, that the Urines of the ſick are made in a large quantity, and very profuſe, that a day and a nights ſpace, they make perhaps twice or thrice as much water as the Liquids they have taken; the cauſes of which diſtemper are alſo various, and the ſignifications very divers; if after the ſuppreſſion in of Urine, or its quantity formerly leſſened, if in Hydropick diſtempers, Rheumatiſms, or paſſions of the nervous ſtock, or in the Criſes of Fevers, a flowing down of the Urine follows, either of its own accord, or by the uſe of Diureticks, it denotes a Cure of the diſeaſe, or preternatural diſpoſition, or at leaſt a declining of it. But if (as I have often obſerved) in a lean and weak conſtitution (without any of the

previous

previous diſtempers but now recited) the Urine exceeds much the Liquids taken, and from thence a great debility of the whole follows, this indeed ſignifies an evil diſpoſition, with a tendency to a waſting or Conſumption. I have known ſome women of a tender and moſt fine make, who ſometimes being ill, for many days, were wont daily to make water in a great abundance, (exceeding twice the Liquids taken) and that watry and thin, without contents or ſettlement; at which time they have complained of a languiſhing of ſtrength, difficult reſpiration, and an impotency to motion. I ſuppoſe in this caſe, that the blood and nervous juyce grow too ſour, from the ſalt carried forth, and ſuffering a Flux, and therefore that they are ſomewhat looſned in their mixture, and fuſed ſo much into ſerolity, as to be made fit for it. For it is to be obſerved, that all Liquids, though more thick and mucilaginous, if they be kept to a ſourneſs, preſently become for the moſt part watry and limpid: alſo the flowing down of the Urine is ſometimes ſeen to ariſe from ſuch a diſpoſition of the blood and humors: for that the Urine ſo copiouſly excreted, is like Vinegar in taſte; and theſe kind of diſtempers are uſually cured, chiefly by Chalybeates, and not by binding and thickning things.

But as to what reſpects the Colour, the Urine of ſound people may be the ſquare or rule, to which all the reſt of the ſick may be referred; for as the colour of ſound peoples is Citron, the Urine of the ſick is paler than Citron, and ſo either watry, or white, or higher coloured than it; whoſe cheif kinds are, flame-colour, yellow, red, green, and black. I ſhall run through every one of theſe briefly, and endeavour to weigh them together, by what cauſes all the alterations may be made, and what diſtempers, or proviſions of diſeaſes they are wont to make known.

The Urine is watry or limpid, when by reaſon of the indigeſtion of the Ventricle, the ſaline and ſulphureous particles of things eaten, are not rightly ſubjugated, nor being ſmally broken, are made ſo volatile, that being diſſolved in the Serum, they may impart to it a tincture, which it may carry with it, through the ſeveral turnings and windings of its paſſage: For the Latex or juyce to be changed into Urine, becauſe it is forced through very ſecret paſſages, and narrow, as it were by a certain diſtillation; therefore it is wholly deprived of the colour and conſiſtency, which it had from the taken Liquids, and imbibes almoſt nothing, but the volatile part, from the Chyme, whoſe Vehicle it is. Wherefore, if by reaſon of the great crudity, the Salt, Sulphur, and other contents are not firſt made volatile in the Viſcera, nor afterwards diſſolved in the Veſſels, that they may make their paſſage together with the ſerous juyce; it being at laſt ſtripped almoſt of all, is ſent out like clear water. That ſuch Urines do want the active principles, it is a ſign, becauſe they are kept a long time from putrefaction: This ſort of Urine denotes in Virgins, for the moſt part, the Green-ſickneſs, in moſt the Cachexy or Dropſie; in all it is a note of indigeſtion and crudity. Sometimes in thoſe obnoxious to the Stone, it foretels the approach of the fit, *viz.* whilſt the Serum is coagulated by the ſtony juyce in the Reins, its diſſolutions and contents are congealed into a tartareous matter, only a watry juyce or Latex ſtaying behind. Thoſe who for ſome time make a thin and watry Urine, what ever ſickneſs they are obnoxious to, have often adjoyned to it a difficulty of breathing, and ſhortneſs thereof after motion, and diſtention about the region of the Ventricle, and as it were a ſwelling up after eating. The reaſon of the former wholly depends on the defect of ſpirits in the blood, becauſe its liquor is not fully imbued with active principles (of Spirit, Sulphur, and Salt) rightly exalted; therefore it is not ſufficiently kindled by the ferment of the heart, whereby the whole may preſently leap forth, and break as it were into a flame: but that hardly fermenting, and being apt to ſtagnate in the heart, and for the moſt part to reſide there, burdens it grievouſly: wherefore if the blood ſo diſpoſed, is urged more than it is wont, by a more quick motion, into the boſom of the Heart, becauſe not being rarified of its own accord, it may preſently go wholly forth, therefore there is need of great endeavour of the Lungs, and a more quick or frequent agitation, whereby it may be carried forth. Therefore watry Urines ſignifie this kind of Crudity in the blood; becauſe, for as much as they receive no tincture almoſt from the Salt and Sulphur, it is a ſign that the Particles are little diſſolved in the maſs of blood, or are rendred volatile. As to what appertains to the inflation of the Ventricle (of which alſo limpid or clear Urines are the effect and ſign) I ſay, becauſe of a defect of due Fermentation, the Chyle goes not into a volatile Cream, but (like bread not fermented) into a ſad and heavy maſs, which indeed is ſlowly, and not without a reſidence of viſcous Phlegm, carried out of the ſtomach: its reliques being impacted in the folds and Membranes of the Ventricle, obſtruct all the Pores and paſſages, that nothing may vapour forth, nor that the thin and ſpirituous part may be conveyed (as it ought to be) by the ſecret paſſages, to the blood: hence flatulencies are begotten, which continually diſtend the Ventricle, and blow it up beyond its due bulk: alſo when thoſe Feculencies are left a long time in the ſtomach, they abound in a fixed Salt, and degenerate now into an acid, now into a vitriolick matter, or of ſome other nature; from whence Heart-aches, deſire of abſurd things, oftentimes Heat with cruel thirſt, and ſometimes Vomiting ariſe: ſome of which though they argue a very ſharp heat to lye hid within, yet by reaſon of the want of concoction, ſuch diſtempers often render the Urine crude and watry. We have treated thus largely of a limpid or clear Urine, becauſe from hence the reaſons of the reſt (which as to colour and conſiſtency are pale and thin in healthful perſons) may be drawn. For from the Salt and Sulphur, more or leſs diſſolved and boiled in the Serum, the appearances of a pale and ſtraw-coloured Urine, and of other colours, under a Citron colour, are excited; and by the like means, which was ſaid of the watry, they may be unfolded.

There remains another certain kind of Urine, more pale than the Citron Colour, not thin but thick and cloudy, and of whitiſh colour; it appears by common obſervation, that children do often make ſuch water, when they are troubled with the Worms: The reaſon of which ſeems, becauſe the matter whereof the worms are made, is a certain viſcous Phlegm, heaped up in the Viſcera, by reaſon of the indigeſtion of the Chyle, and a defect of making or generating Spirits, which matter at firſt tranſmits no tincture to the Urine, becauſe of its fixity, the ſame afterwards putrifying is exalted, and is in ſome manner volatilized; and then partly by heat and ſpirit, is formed into worms, and partly being confuſed with the paſſing Chyle, and carried into the veſſels, when 'tis made unfit for nouriſhment, it is ſeparated with the Serum from the blood, and being mixed with the Urine, gives it that white colour. Sometimes alſo in Fevers, eſpecially of children, The Urine is whitiſh: the reaſon of which is, becauſe the ſupplement of the nutritious juyce being poured from the Chyle to the maſs of blood, is not rightly aſſimilated, degenerater into an excrementitious humor: A portion of which being incocted in the Serum, imparts to it the the thick conſiſtence and milky colour: otherwiſe than in the Fevers of thoſe of riper years, where when the heat is ſtronger, the ſame degenerate juyce impreſſes on the Serum a red colour. Alſo the Urine is whitiſh in the flowing of the Whites, the Gonorrhea, Ulcers of the Reins and Bladder, and of the Urinary paſſages, by reaſon of the confuſion or mingling of the filthy matter, or the corrupted ſeed: howeves it be, that the colour of the Urine be white, it is produced from its contents, which at laſt putting down its ſettlement to the bottom, the liquor for the moſt part becomes of a paliſh and yellowiſh colour; even as it may be perceived by the making of the Milk of Sulphur, where the milky ſubſtance ſinking down to the bottom, the over ſwimming liquor is of a Citron colour.

Urines whoſe colour is deeper than Citron, owe their appearance, not only to the Salt and Sulphur diſſolved more than uſual, but in ſome ſort to the more thick contents in the liquor. The more plentiful diſſolution of the Salt and the Sulphur, is chiefly performed in the veſſels, in the maſs it ſelf of the blood, and from thence the Tincture is impreſſed on the ſerous Juyce: But this happens to be done for the moſt part, after a double manner, *viz.* either by reaſon of the feveriſh fervour, for as much as the blood boiling in the veſſels, and being more kindled in the Heart, is very much looſned in its mixture, and ſo copiouſly fixes on the Serum the particles of Salt and Sulphur, waſted as it were by the boiling: Or without a Fever, when theſe kind of ſulphureous and ſaline little bodies, wont to be ſent forth at other ſinks, are reſtrained; and ſo being by degrees heaped up in the blood, are poured into Serum. Of this alſo there are two cheif cauſes or means; for either the excrements of the blood, which cheifly participate of aduſt Sulphur, and that ought to be ſent away by Choler-carrying veſſels, are retained, and ſo they impreſs, being ſuffuſed on the ſerous humor, a tincture of yellowneſs: or elſe the Effluvia's, which are chiefly of a Saline nature, and ought to be evaporated by inſenſible tranſpiration, are reſtrained, and from thoſe the urine is filled with a lixivial tincture. The Urines of the former kind are proper to people that have the Jaundice; but thoſe of this latter are familiar to the Scurvy: for in the Scurvy the ſaline particles of the blood depart from volatilization, and get a Flux: wherefore, by reaſon of their fixity, they will not evaporate, and ſo being more fully heaped together in the blood, they more and more pervert its Craſis, and very much impregnate the ſerous humor with a ſaltneſs. The contents which heighten the colour of the urine, are of a twofold kind to wit, either aduſt recrements, remaining after the deflagration of the blood, or particles of the nutritious juyce, degenerated into an extraneous matter: Concerning which we ſhall ſpeak hereafter in their proper place. It now remains that we deſcribe particularly the ſeveral colours of urine more intenſe or deep than Citron colour.

1. The firſt is a flame-coloured Urine, which ſhines with a brightneſs like the Spirit of Nitre: and this is very often ſeen in an intermitting Tertian Fever; this colour ariſes from a portion of the thinner yellow Bile, mixed with the Serum, whilſt it is in motion: for that in this Fever there is a ſharp and hot intemperature of the blood, which burns and ſcorches all the humors, and ſo plentifully begets Choler. But although this, for the moſt part, is ſeparated from the maſs of blood by the Bilary veſſels and paſſages; yet when it abounds in the veſſels, a part of it, or (which is the ſame thing) ſome burnt and aduſt particles of the blood and humors being boiled in the ſerous water, impart to it an high or deep yellowneſs. This urine is thin and ſhining, for that there is in this diſeaſe almoſt a continual breathing forth, that thruſts out the recrements of the nutritious Juyce, and all the thicker parts of the Serum towards the circumference of the body.

2. The Saffron-coloured Urine, and which dyes Linen with the ſame colour, undoubtedly is a ſign of the Jaundice: it is tinged after this manner by the yellow Bile or Choler, or by the Salt and Sulphur burnt and plentifully mixt with the Serum: for the yellow Bile is neceſſarily begot from the yoked heat and motion of the blood; but for this the Gall bag is deſigned by Nature, for the ſeparating it from the maſs of the blood, its paſſages being rooted in the Liver: But if ſuch a ſeparation be any ways hindred, that humors flowing back in the blood, and copiouſly heaped together, infects the skin with its yellowneſs, the blood, and eſpecially the ſerous Latex. The Saffron-coloured Urine differs from the flame-coloured, becauſe in this only a certain portion of the more thin Bile is poured into the Urine, but in that the more thick part, and much more plenty: beſides, in the yellow Bile the Sulphur, with the Salt, being joyned and long circulated, is fully diſſolved by it, that it becomes like paint, imparting to every ſubject a Saffron-coloured tincture; as when common Sulphur and Oyl of Tartar are mixed together. But what things cauſe a redneſs Urins, without the reſtagnation of this Bile,

happen

happen after the ſame manner as in the Lye of Aſhes: where the particles of the Sulphur, without any previous diſpoſition from the ſaline, are forthwith put down with them in the Liquor.

3. It remains that we ſpeak next of red Urines, which are of a divers habit, neither do they always depend on the ſame cauſes, nor plainly denote the ſame kind of diſtempers; we ſhall briefly run through the cheif differences and proper ſignifications of them. Firſt, the liquor of the urine is either red of it ſelf, and remains after the ſame manner, nor is the colour altered by the ſetling or ſinking down of any of the parts: or ſecondly, the redneſs of the urine chiefly owes its colour to the Contents, which being ſetled to the bottom, the liquor grows yellow, or is leſs red. The diſtempers that theſe kind of urines are wont to ſhew, are chiefly Fevers, and a confirmed Scurvy, and Conſumption. W ſhall now conſider the reaſons of each.

1. When the Urine that is made red ſo remains, it is firſt of a mean conſiſtency, and ſomewhat clear, and then it owes its colour to the Salt and Sulphur, being burnt more than uſual, and ſo boiled more copiouſly in the Serum: or ſecondly, ſuch an urine is red, and alſo troubled and cloudy: but this, beſides the contents of Salt and Sulphur, has boiled in it ſome earthy particles alſo, which indeed being impacted in the Pores and paſſages of the ſerous Latex, do not deſcend: becauſe the liquor of the urine is deſtitute of convenient ſpirits, which may ſegregate all heterogeneous things, and drive them to the bottom, as it is wont to happen uſually in dead drink, or Beer growing ſour by reaſon of Thunder; where the liquor is infected with a troubled Feces, and by reaſon of the defect of ſpirits, will not grow clear; wherefore this kind of urine is a very bad ſign in Fevers becauſe it ſhews ſuch a confuſion in the blood of aduſt and to be ſeparated matter, ſuch as the vital ſpirits are not able to maſter by taming and ſubjugating it.

2. Sometimes the Urine is made red, by reaſon of its contents; which ſetling in the bottom, the liquor becomes of another colour: but theſe contents, as before we hinted are twofold, *viz.* now thin, which are the remaining matter, or aduſt recrements after the burning forth of the blood; now more thick, to wit, the degenerate particles of the nutrious Juyce; both theſe being torrified, and ſeparated from the burning blood, are partly thruſt forth by Sweat, and partly mixed with the ſerous Latex, thicken its conſiſtence, and heighten its colour, *viz.* ſo long as theſe kind of contents are included in the Pores and Paſſages of the liquor, they are ſuſtained, the colour of the urine appears more deep, and the conſiſtency thicker: but theſe being precipitated to the bottom, both the redneſs and thickneſs of the liquor are leſſened. The reaſon of this ſhall be given anon, where we ſhall ſpeak of the Cauſes of the Colours, and alſo of the Clearneſs and Cloudineſs of Urines: we ſhall now inquire, what is the reaſon of the difference, that red urines: are wont to be made both in Fevers, and alſo in the Scurvy, Conſumption, and perhaps in ſeverall other diſtempers.

1. In Fevers, the liquor of the Urine is filled with redneſs, becauſe of the more plentiful diſſolution of the Salt and Sulphur, and their particles copiouſly boiled in the Serum; for whilſt the blood and humors grow hot, from the feveriſh cauſe, by reaſon of the heat being more fully inkinded, the ſaline and ſulphureous little bodies being burnt and torrified, are more diſſolved; and being boiled in the ſerous Juyce, impart to it a deeper tincture: Even as if the Lye of Aſhes be boiled over the fire, it grows more red, than if it were only only made by infuſion. Alſo in Fevers, the contents of the urine moſt often increaſe its colour, *viz.* by reaſon of the intemperance and deflagration of the blood, both the degenerate particles of the nouriſhing Juyce, and alſo other matter (as it were the Aſhes remaining of the burning of the blood) are burnt together, as it were into a reddiſh Calx; which being included in the Pores of the urine, renders its colour deep, and afterwards ſinking down, makes a ſediment like red Oker.

2. In a long Scurvy, the liquor of the Urine grows ſometimes ſo highly red, that it cannot be greater in a burning Fever: if ſuch urine be evaporated, or expoſed to diſtillation, it will ſhew great plenty of Salt, with a muddy Feers or dreges: wherefore it ſeems to be manifeſted, that this deep redneſs doth cheifly ariſe from the Salt, (as we have already hinted) by this Experiment; becauſe in Scorbutick people the ſaline particles, which ought to be made volatile, and ſo conſtantly exhaled by tranſpiration, become fixed, and being hindred form a flux, are heaped together more plentifully in the diſtempered body. The Salt remaining within, is variouſly coagulated with Sulphur and Earth, and then is continually diſſolved: and from this diverſe coagulation and diſſolution, the to be admired Symptoms of this Diſeaſe are cauſed, Alſo from the ſaline little bodies plentifully diſſolved with Tartarous feculencies, and diluted with the Serum, urines are filled with an high redneſs; to which moſt often happen in this inveterate diſeaſe vices of the Liver and Gall; for when theſe inwards, being either obſtructed or other ways depraved, cannot perform their tasks, for the ſeparting the aduſt particles of the blood, they being more fully heaped up in the blood, are diſſolved in the ſerous Juyce, and infect it yet with a more lixivial tincture. And if the aduſt particles of the Sulphur do excel the reſt of the fixed and ſcorbutick Salt, the yellow Jaundice happens together with the Scurvy, and the urine fixes to Linen a Saffrony tincture. But if they be leſs than they, and that the ſaline particles excel, the Scorbutick diſtemper only is produced, in which the urine in intenſly red, yet does not dye the Linen. I am perſwaded that it is thus; becauſe, when I have opened the dead carcaſſes of many dead of the Scuryy in whom there was a red urine, I obſerved that the Liver or Gall was in fault: In ſome the Liver was wholly without blood, and dry like a Cows Udder; in others the bag of the Gall was empty, and nothing in it; in others it wa. beſet with little ſtones; in others it was filled with filth, not bitter; in all theſe Inwards were ſo diſtempred, that the ſecretion of the Bile was hindred.

3. By reaſon of this kind of diſſolution of the Salt, Urines ſometimes grow red in Arthritick diſeaſes: for beſides the Gout (in which ſuch Urine is often made) I have obſerved in ſome a painful diſtemper, and as it were like a Fever, cauſed, with a very high-coloured Urine; they had wandring pains, now in this place, now in that, grievouſly tormenting, that the ſick were ſcarce able to ſtand, or to ſtir their limbs: they were obnoxious to wakings and frequent ſweats; they were alſo troubled much with thirſt, and heat of their mouth: and they had a Urine highly red, with a plentiful red ſediment. In the mean time it did not appear, either by the Pulſe, languiſhing of the Spirits, or Head-aches, that the blood grew exceſſively hot, or that they had a Fever. Wherefore I ſuppoſe that this kind of diſtemper doth chiefly conſiſt in the nervous ſtock, and depends on the exorbitances of the ſaline Principle, rather than the ſulphureous.

4. Alſo in the confirmed Phthiſis or Conſumption, eſpecially if an Hectick Fever be joyned with it, there is a red Urine; the reaſon of which is, if at any time an Ulcer is excited in the Lungs, the putrid filth from thence being mingled with the blood ſliding by, cauſes in it almoſt a continual effervescency, whereby the ſulphureous and ſaline particles being more plentifully diſſolved and boiled in the Serum, affect its liquor with redneſs: beſides, by reaſon of the blood being defiled after this manner, the nouriſhing Juyce degenerates almoſt wholly into putrefaction, by whoſe recrements the Urine being filled, grows more red, and is very much ſtuffed with contents: The ſign or note of this is, that the ſick for the moſt part grow hot after eating, and that they are troubled with an heat through their whole body, followed with a nightly ſweat; beſides, their Urines yield a thick and copious ſediment, to wit, when the nouriſhing Juyce, being mixed with the blood, is not aſſimilated, it ſtirs up in it a fervour, and being degenerate into an extraneous matter, exhales partly by ſweat through the Pores of the skin, and partly being tranſmitted to the Urine, very much heightens its colour and conſiſtency.

Thus far of a red Urine, whoſe ſeveral ſpecies, but now related, have more degrees of intention and remiſſion, accordingly as the cauſes, altering the colour and conſiſtence in them, are either weaker or ſtronger.

4. As to what belongs to a green and black Urine, I confeſs I have never ſeen thoſe kind of deep colours (exactly like thoſe of Leeks and Ink) in any Urine: but I imagine I may have ſeen the appearance of a greeniſh colour from a more deep yellow, and of a blackiſh Urine from the ſame with a cloudy and ſomewhat a dark mixture, and from thence called by Authors a green and black Urine. But thoſe Urines, coloured after that manner, are eſteemed either ſigns of the Jaundice, or of being diſtempered with ſome virulency of the blood, if they continue ſo conſtantly for ſome time: or ſuch Urines, as occaſion offers, are variouſly changed, and are now of this or that, and preſently of another colour. So I have known Hypochondriacks wont to make ſuch Urines, as it were critically for ſome time, and then afterwards to render them like ſound men. As to the firſt, when the Jaundice is very great upon them, that the aduſt portions of Sulphur and Salt remain a long time in the maſs of blood, they acquire by a long incoction a fulneſs of the yellow colour, at firſt green, and afterwards black, and impart the ſame to the Serum: For if the yellow Bile, being taken out of the bag of the Gall, and put into a Cucurbit, be expoſed to the gentle heat of a Bath, the ſame in a ſhort time will grow green, and afterwards appear like the blackeſt Ink: wherefore in the black Jaundice, which is only the yellow carried forth into a worſe ſtate, by its long ſtay or continuance, there is nothing more uſual than to make black Urine. Beſides, theſe kind of Urines ſometimes appear in a malignant Fever, and in the Plague, alſo often from drinking of poyſon, and in this caſe it is for the moſt part a ſign of death, becauſe it argues the blood greatly corrupted, and the ſpirits profligated, and the bond of the mixture looſned, as it were the deadly or mortified diſtemper: even as were ſome part of our body, being diſtempered with an Ulcer, is afterward taken with a Gangrene or mortification, forthwith the flowing corrupt matter, which was at firſt white, wateriſh, or yellow, becomes black. Wherefore in the forementioned diſtempers, when the Urine grows black, the Serum and the blood being wholly vitiated, the skin alſo is dyed outwardly with ſuch a colour. As to what belongs to Urines periodically tinctured with a greeniſh colour, and eſpecially with black (which happen often to Hypochondriacks) it is moſt likely, that ſuch ariſe from the melancholick Feculencies laid up in the Spleen, and from thence, by reaſon of its congeſtion, too much flowing forth ſometimes, and confuſed with the blood: for ſuch a matter, being often poured into the Ventricle in ſome men, ſtirs up black Vomitings; alſo in others, the ſame being ſupp'd up from the blood paſſing through, may impart ſuffuſions of the ſame colours to the ſerous Juyce.

So much for the Colours of Urines, of which the more pale ariſe from too much Crudity, almoſt all the high-coloured, either from the Salt and Sulphur plentifully diſſolved, and ſometimes from the aduſt recrements throughly boiled in the Serum, or from the more thick contents of the Urine; whether they be the Calx and remaining part of the aliment, degenerated in the concoction, or the waſting or melting of the pining body, or ſome part of it evilly diſtempered: what hath been ſaid may be better underſtood, if the means, whereby theſe kind of diſſolved things or contents are able variouſly to change the colour of the Urine, be unfolded.

The cauſes of the diverſity of appearances of colours, and their variouſly changing, as alſo of the cloudineſs and clearneſs in Urines, (as in all other Liquors) depend only on the various incidency and emerſion of the beams of light, as is hinted in another place, in the Tract of Fermentation: For if the ſubſtance of the liquor be rare and thin, with open Pores and paſſages, that the beams of light may eaſily paſs through,

through, it is ſhining and clear like fountain water: but if the Pores of the liquor be filled with contents, or little bodies ſwimming in it, ſo that the luminous beams are broken in their paſſage, but ſo that at length they may ſhew themſelves, according to thoſe various manners of refraction and emiſſion, there will appear a Citron, a Saffron, or red colour in a yet clear liquor. If that, in the little ſpaces of the Porces yet more obſtructed, the light cannot paſs through, there is a darkneſs induced: but then if the immerſed beams be a little or nothing reflected, the liquor will appear of a brown or dark colour; but if they are beaten back, according to the diverſe manner of reflection, a white, aſhy, or ſome other kind of appearance, is induced. From this being ſuppoſed, according as the liquor of the Urine, ſometimes almoſt wholly deprived of Salt and Sulphur, and other things diſſolved, eaſily admits of light, ſometimes either very much ſtuffed, or elſe moderately with theſe kind of contents, either diſtorts the beams falling on them in their paſſage, or wholly imbibes them, or laſtly beats them back; it were eaſie to explicate all the Phænomena or appearances of colours and their conſiſtence.

It often happens, that the colour of the ſame Urine is variouſly changed: for what is made red, being expoſed to the air, becomes white, or of a dark colour, and then after a long time of Citron colour: the reaſon of which is this, if I am not deceived, this kind of Urine, when it is made, is red, becauſe the Pores of the Liquor are very full of contents; yet ſo long as they are dilated with heat, they tranſmit the rays of light, (although variouſly diſtorted) that they may at length ſhew themſelves or appear; but this Urine is no ſooner expoſed to the cold, but that the Pores being ſtraitned, the ſite and poſition of the parts is changed in the contents, and by that means the paſſage of the beams of light is hindred: wherefore the liquor preſently becomes cloudy, and according as thoſe beams are reflected after this or that manner, a white, or brown, or ſome other kind of colour is induced: but at length the contents falling down towards the bottom with their weight, the Pores being freed, tranſmit again the rays of light, and do not diſtort them; wherefore a clear or a Citron colour appears.

From theſe things which have been ſpoken concerning the Colours of Urins, may appear what is the cauſe of the various conſiſtence of Urines. For the particles of Salt and Sulphur, of the aduſt matter, or nutritious Juyce, depraved in the ſimilating, are more or leſs boiled in the Serum, Urines alſo get their more thin or thick conſiſtency. It remains next that we ſpeak more clearly of the Contents in preternatural Urines, whereof we have often made mention.

CHAP. V.

Of the Contents in the Urines of ſick People.

WE ſuppoſe the Contents in the Urines of ſick people to be twofold, *viz.* either univerſal, which proceed from the maſs of Blood, and of the nervous Liquor, and reſpect the habit of the whole Body; or particular, which are the layings aſide or excrements of one bowel, or part ill affected, of which we ſhall ſpeak anon. Thoſe of the former kind, which come away from the whole, are either natural, *viz.* Filaments or ſmall threads conſtituting the Hypoſtaſis or ſettlement, as in ſound Urins; or preternatural, which chiefly are particles of the nutritious humor degenerate from aſſimilation, and conſtitute to more thick bodies of the ſediment in Urines; and laſtly to theſe, (if there be a feveriſh intemperance) the aduſt matter of the blood after deflagration, and diluted in the ſerous Juyce, is added, and increaſes the bulk of the Contents.

But theſe Contents, both natural and preternatural, of Urines, repreſent themſelves after a various manner, as the blood more or leſs unduly grows hot, alſo as the aliments in the bowels and veſſels are variouſly concocted, and either the ſuperfluities or corruptions of the Chyme, thence made, are waſhed away with the Serum: for if the nouriſhable humor tranſmitted to blood, is not at all perverted, but a great portion of it, laid upon the ſolid parts, is changed into nouriſhment, ſome parts of this alſo rightly made, being mixed with the Serum, impreſs yet ſome marks of an Hypoſtaſis in Urines: Alſo from the aduſt or degenerate matter, a preternatural ſediment is framed, yet little and thin, neither doth it wholly blot out the appearances of this natural. Wherefore in the begininning and declination of a Fever, ſometimes alſo in a Conſumption, or a Cachexy, an Hypoſtaſis, though not ſo perfect, is perceived. If that the greater portion of the ſame Chyme, growing hot with the blood, by reaſon of the immoderate heat, is perverted into an heterogene matter, which afterward is ſent away with the Serum, as hurtful and unprofitable, preſently an obſcure and imperfect Hypoſtaſis appears; and beſides it, very many contents are ſeen in the Urines, which heighten their colour and conſiſtency. Such an Urine, which contains an Hypoſtaſis, though imperfect, together with other things of the ſame kind diſſolved in it, if it be kept in a warm place, the Hypoſtaſis will be perceived alone; but the reſt of the contents, comprehend in the pores of the Urine, dilated by the heat, are made wholly inconſpicuous or not to be ſeen: yet afterwards the little ſpaces of the Pores being ſtraitned by cold, the ſame contents are precipitated,

and

and by that means they render the ſite and poſition changed, and the Urine troubled and cloudy, and blot out the appearance of the Hypoſtaſis. Theſe kind of Urines in the better ſtate of Fevers in a Catarrh, Cough, difficulty of perſpiration, fulneſs of humors, and in the more light Dyſcraſies are wont to be made.

But if in the more grievous ſtate of ſickneſs the Concoction be wholly vitiated, and the whole nutritious Juyce changed into a putrefaction, theſe kind of contents alſo may be perceived in the Urine without an Hypoſtaſis, and ſignifies variouſly in diſeaſes, after their various ways of being precipitated, and ſinking down, and conſtituting a diverſe kind of ſediment; to wit, as the ſeparation of the parts ſucceed ſoon or late, or not at all; and as the matter falling down ſhall be little or much, or alſo of a white, red, or dark colour. I will briefly run through what is moſt notable and worthy obſervation concerning this thing.

1. This kind of Urine being full of contents, is not ſometimes at all precipitated, (unleſs the ſubſtance of the liquor be diſſolved by putrefaction a long time after) but remains a long while troubled and ſomewhat cloudy, with little bodies ſwimming through the whole. The reaſon of this is, either becauſe theſe contents are too much incocted in the Serum, ſo that the ſpirits implanted therein, cannot ſeparate the pure from the impure, the thick from the thin; as may be perceived in brewing Beer, if that the Mault be too much boiled, the liquor ſhall never grow clear: or elſe the Urine remains troubled, becauſe it is wholly deſtitute of ſpirits, which may compel the parts of the liquor into the motion of Fermentation; as it uſually comes to paſs in Beer growing ſour by reaſon of Thunder, or of immoderate heat, and being infected with a troubled Feces or Lee, will ſcarce ever be rightly made clear again. This kind of Urine is perceived for the moſt part in very dangerous Fevers, and ſometimes in a deſperate Cachexy, and always portends evil.

2. Sometimes it happens, that the Urine is ſo full of contents, that it begins to be troubled whilſt it is yet warm. I have often obſerved it, after this manner, in a ſlow Fever, whoſe heat was gentle and more remiſs, to wit, in which the particles of the nutritious craſſament or ſubſtance are depraved, but being a little ſubdued by heat, or boiled in the Serum, they eaſily fall out of its pores: as when common Sulphur is boiled in Lye, if that before it be perfectly diſſolved, it be taken from the fire, the liquor at firſt clear and red, by reaſon of the quick precipitation of the diſſolved matter, becomes preſently troubled, dark, and of a ſomewhat whitiſh colour.

3. But what moſt uſually comes to paſs, that this ſort of Urine, big with contents, as long as it is hot, and ſome time after, ſeems clear and perſpicuous, when it grows cold, is wont to be troubled, and as if ſome Runnet were infuſed to be precipitated according to all its parts; yet the ſame, if held near the fire, or in warm water for a little ſpace, ſhall grow clear again. The reaſon of this is already fully unfolded, where we ſpake of the Cauſes of Cloudineſs and of Clearneſs.

4. After that the Urine being expoſed to the cold, is precipitated in this manner, it may be obſerved by what means its contents deſcend to the bottom, for ſometimes they ſettle in ſhort a time: and if the liquor grows clear in the ſpace of two or three hours, it is a ſign that the liquor of the Urine is not too thick, nor very much filled with Salt and Sulphur: wherefore in the beginning or declination of Fevers, when the heat is ſlack, ſuch an Urine is moſt often made: ſometimes ſuch a ſettlement follows not but in the ſpace of many days; the reaſon of which is, becauſe the conſiſtence of the liquor is thicker than it ſhould be, therefore the contents or diſſolved things are not ſo eaſily let go from its embrace, that they may fall down to the bottom by their weight. Theſe kind of Urines are wont to be made in the ſtate or height of Fevers, and moſt often precede an evil Criſis.

5. Of no leſs a diverſs kind are the ſediments which fall to the bottom. That I may paſs over in this place the filthy matter, and blood, ſand, gravel, and the like, depoſited from ſome parts, I ſhall mention thoſe which are the products of the whole body, and they for the moſt part are either white or brown, or red like Oker: If you ſtrain Urine, when it hath ſtood long, through brown paper, you may collect theſe contents. I have often ſeen a whiteneſs like Chalk, and ſometimes red like Bole Armene, without doubt there is the ſame matter of all, to wit, the recrements of the deflagrated blood, and of the nutritious juyce depraved in the aſſimilating: which, as they are burnt by heat in our body, and diverſly perverted, appear alſo in the Urine under a various colour and form; even as Antimony mixed with Nitre, as it is more or leſs calcined exhibits a Calx, now red, now Saffron colour, now yellow, now brown: The like reaſon is (as it ſeems) of the ſediments of Urines, which are as it were the Calx of the ſulphureous and earthy matter burnt forth by the fire of the Fever in the Viſcera and Veſſels.

6. Beſides theſe kinds of Contents, which happen in the Urines of ſick people, I have often obſerved, that after the Urine had ſtood a long while, ſomething was affixed to the ſides of the glaſs like ſand, and indeed in divers figures; for now theſe little bodies like ſand grow together with a ſharp and unequal ſuperficies, now with ridges like the Cryſtals of Nitre, and ſome ſhine and are pellucid like Ice. I have ſeen theſe kind of Cryſtals fixed to the Urinal, ſometimes in the Urines of thoſe troubled with a Dyſentery, alſo in thoſe troubled with pertinacious wakings. Sometimes in Urines, when they have ſtood long, a certain Cream will ſwim on the top, as when Tartar is boiled in water: this kind of whitiſh cruſt growing together in the ſuperficies of the Urine, is commonly thought to be fat and fattiſh things, and taken for the melting of the ſolid parts: wherefore ſuch as are wont to make ſuch an Urine, are preſently pronounced to be conſumptive, and in a deſperate condition: But indeed that is only a ſaline concretion

which,

which if put into the fire, will not melt, but grows hard into a cruſty ſubſtance. Yea both this and the other concreſcences of Urines are as it were the Tartar brought forth in them by a certain Coagulation: But ſuch a concretion depends altogether on the particles of the fluid or acetous Salt, combined with others of the fixed or Alcaliſate Salt: For in every ſubject where there is a commixtion of the Salts of either kind, Cryſtallizations and Coagulations of a diverſe manner are cauſed, either ſpontaneously by Nature, or may be procured by artificial ſeparation: wherefore this kind of Urine, on which this Cream ſwims, or that Cryſtals gather in the ſides of the Veſſels, indicates the blood to be departed, from its ſweet and Balſamick nature (ſuch as depends of the volatile Salt) into an acid and corroſive, by reaſon of the flux and fixity of the ſaline Principle. Such an Urine, if it be evaporated, leaves in the bottom of the Veſſel great Plenty of Salt: the diſtempers wherein it is uſually found (as I have often obſerved) are ſpitting of blood, Atrophy, or general waſting, and the Hypochondriack diſpoſition.

In the Urines of ſick people it is worth obſervation, whether they dye the Urinal or not? For ſometimes in Fevers the Urine is no ſooner put into the Glaſs, but preſently it darkens its ſides with a whitiſh cloud, and again at another time this does not happen: I ſuppoſe that the Glaſs is dyed, when the liquor of the Urine is fuller of diſſolved Sulphur, than its pores can contain within themſelves; as may be preceived in Lye, wherein common Sulphur or Antimony is boiled: Alſo every Urine, if it ſtand in the Glaſs till it putrifie, will infect its ſides with a cruſt or cloud, ſometimes whitiſh, ſometimes reddiſh, ſometimes of another colour: for the frame of the liquor being looſned by putrefaction, the particles of the Sulphur being looſned from the bond of mixture ſtick to the Glaſs: But in the Urines of ſick people ſometimes this preſently follows, becauſe the Sulphur is more copiouſly diſſolved than can be included in its pores.

As to what reſpects the particular Contents of Urines, they indeed are manifold, and may come from many parts and places: yet they moſt often depend on diſeaſes implanted about the Reins, Bladder, and Urinary paſſages: ſometimes it happens by reaſon of an Impoſthume in the Liver, Spleen, Lungs or other inward; or by reaſon of preternatural humours heaped up in thoſe places, and flowing out with their fulneſs, an extraneous matter is tranſmitted into the maſs of blood, and thence into the ſerous Juyce: but this happens more rarely, becauſe an impoſthume being broken within, for the moſt part pours out its matter into the cavities of the Viſcera, from which there is no paſſage open into the Urinary paſſages: beſides the maſs of blood flowing with impurities, does not preſently endeavour to ſend them forth by Urine, but oftener by ſweat, ſpitting, breaking out of Wheals, Tumors, or by other ways of excretion. Wherefore it appears by common obſervation, that the other contents of Urines (that which we have above cited) are chiefly ſent from the Reins and their dependences; the chief of which are ſand, ſtones, blood, matter, bits of fleſh, skins, branny or mealy ſediments, which for the moſt part ſignifie either the ſtony or an ulcerous diſtemper, or both together, planted beyond the emulgent Veſſels.

It is an uſual thing for ſome to void with their water, gravel or ſmall ſand of a red colour in great quantity; ſome of theſe are obnoxious to the ſtone in the Reins, and are frequently tormented with Nephritick fits: I have alſo known others without pain, or other grievous Symptom, for a long time to make a ſandy water. All Urines whatſoever, if they ſtand for ſome time in a leaded or earthy glazed veſſel, affix this kind of red ſand to the ſides and bottom of the Pot, to wit, the volatile Salt of the Urine is coagulated with the fixed Salt of the Metal: ſo when Salt Armoniac being mixed with the filings of Steel, Sea-Salt, or Vitriol is ſublimated, the elevated flours grow notable red: wherefore it ſeems that theſe kind of little ſands are begot in the Reins, for that the Salt of the Urine is coagulated with the Tartarous feculencies laid up about the windings of the Reins, from whence the ſandy matter is made, which is preſently waſhed away by the ſerous Juyce paſſing through: Therefore the gravel that is ſo frequently made are no ſmall parts or fragments of a greater ſtone, (as is commonly thought) but extemporary products of the blood and Serum waſhing the winding paſſages of the Reins.

By what means little ſtones are produced in the Bladder or Reins, is not to be fully diſcourſed in this place: But without doubt it is done rather by Coagulation than Exſiccation or Excalefaction, by drying or heating. I have obſerved ſome ſick of the Stone in the Bladder, who after they have made water, were wont to void with great ſtriving and pain a thick and viſcous Juyce, which preſently hardned into a ſcaly matter: the ſmell of this was like Lye, and of ſuch a conſiſtence as Lye evaporated to a thickneſs, the liquor of which being made thick, preſently ſtiffens into a ſaline hardneſs. Leſſer ſtones ſometimes paſs through the Urinary paſſages, and are carried out: the greater remain unmoved in their Cells. The places wherein they are uſually begotten are the narrow winding boſoms of the Reins, from thence the ſmaller ſlide into the Bladder, and if not excerned, they grow into great ſtones. I once ſaw many great ſtones ſhut up as it were in a Cheſt about the ſides of the Bladder between its Membranes; theſe without doubt being ſent from the Reins while ſmaller remained in the paſſages of the Ureters, creeping between the Coats of the Bladder, and there by degrees did increaſe in bulk. A Matron ſo diſtempered long before her death, caſt out of the Urinary paſſage a Membrane thick and broad, full of ſandy matter, which (as appeared after her body was opened) was part of the interior Tunick of the Bladder worn and broken by the ſtones there included.

It is

It is ordinary for Nephritick people, or such as are troubled with the Stone, frequently to void blood or matter with their Urine: for from a greater stone, and endued with sharpness, the flesh of the Reins is easily worn, and the mouths of the Vessels opened, whereby blood flowing out, tinges the Urine; and when a solution of unity is caused in this manner in the Reins, an Ulcer most commonly follows, whereby matter and filthy stuff are poured out with the serous water, and constitute a plentiful and stinking sediment in the Urine: then the sore being more inlarged by the Ulcer, more large profusions of blood often follow, and the flesh it self of the Reins being worn away, and by degrees eaten off, is voided with the Urine. I visited once an ancient Woman, who daily voided with her Urine, for many months, pure blood in great quantity; besides, as often as she made water, she used to void in great quantity pieces of flesh, great gobbets, as it were the little Tubes of the Vessels eaten away, that it was suspected one of her Kidneys was all thus cut away from her body: yet afterwards by a vulnerary Decoction acidulated with Spirit of Vitriol, that bloody water was staid, and this Woman lives still well and in health. I knew another Matron, who used for a long time in making water to void at first blood with a purulent matter, and Membranes: then the bloody water ceasing, for many years she made a wateriſh Urine with a copious sediment, and white like snot, sinking down to the bottom of the Urinal. Afterwards when she began to want that sediment, a Feverish intemperance followed with pains wandring here and there, with a languishing of strength, and other dangerous Symptoms: and when this sick Woman was brought into danger of her life, a Tumor arising in her left side about her Reins, and ripening into a Boil or Sore, by reason of the large flowing out of the matter, freed her: but yet an hollow and sinuous Ulcer pouring out a thin matter, remained in that place during her life: and being sometimes healed up, would presently break out again. Scarce two years after this Noble Lady having endured the suppression of her Urine for fourteen days, became apoplectick and died. Her body being opened, her left Kidney was quite gone, in the place of it a membranous substance growing to the Loyns, infolding the extremities of the Vessels and Ureter, was grown up: some prints or marks of the Ureter remained, but without any opening into the hollowness of the passage: yea a certain Ichor or serosity dropping out from the little mouths of the emulgent Artery, was carried outwardly into that sinuous Ulcer. The other Kidney was very full of sandy matter and small stones; besides, near the top of the Ureter a stone about the bigness of ones thumb was fixed, whose extremity was so fitted and firmly impacted to the passage or cavity of the Ureter, that it shut it up just like a Tap, and quite hindred the passage of the serous Juyce. The purulent matter comes into the Urine, not only from the Reins, but sometimes out of the Bladder and Urinary passage distempered with an Ulcer; and sometimes also a corrupt seed, or white flux, or menstruous blood are poured into Urines from the Vessels and genital parts, and produce in them preternatural settlements.

4. In the Urines of sick people are often seen abundance of white Contents composed of most small bodies; which, when they are setled, fill up above half the liquor, and make it white and duskish, the rest remaining limpid, and thin in the upper region of the Urinal: this kind of sediment is called Mealy, because it is like water imbued with meal. Concerning this it is doubtfull, whether it proceeds from the whole mass of blood, or only from the Urinary Viscera. It appears by observation, that the same sort of Urine is all ways made in the stone of the Bladder, also sometimes by reason of the Kidney being oppressed with some great stone. I never saw such a settlement in Urines without Nephritick distemper; wherefore I have thought it almost indubitable to be always a sign of the Stone: And it seems that it should wholly depend on the juyce or humour heaped up about the bulk or substance of the stone: For where the stone is fixed in the Kidney or Bladder, the nutritious humour is there perverted from assimilation, and degenerates into a more thick mucor, which uses to be copiously heaped up; like Ichor, which by reason of a Pea put into an Issue, runs out plentifully. But this mucor or filth being washed with Serum, makes that white sediment.

CHAP. VI.

Of Judgments to be given concerning the Urines of sick People.

SO much for the Anatomy of Urines, wherein are unfolded their Elements and constitutive Principles, together with their chief Accidents, *viz.* Colour, Consistence, and Contents, both what ought naturally to be in them *per essentiam* or essentially, and also what are wont to happen to them preternaturally, by reason of the body being ill affected. It will be easie for any one to accommodate this Hypothesis to practice, and to give Judgment on Urines beholding them in the Urinal; for from what hath been said it appears of what parts the Diseases are made known by the inspection of the Urines, and what the Urine signifies in each of them. Concerning this subject there hath been enough said by Authors; I shall therefore only touch upon it briefly, and lightly pass it over.

Although

Although the matter of Urine, *viz.* the Serum of the blood waſhes the whole region of the Body, and is circulated with the blood through all the ſeveral parts, yet it doth not lay open the condition and diſeaſes of them all, but only of thoſe to which it owes either the natural perfection and geneſis of it ſelf, or from which it receives every alteration: wherefore in ſome reſpect it ſhews the action and diſpoſition of the Viſcera ſerving to Concoction, and beſides denotes the temper and motion of the blood and humours in the Veſſels: but that any one ſhould pretend to know from the Urinal, and to divine a pain in the Head, an Impoſthume in the Throat, or any other Diſeaſe of any part, from whence nothing is communicated to the Serum, he ſhews rather his ignorance than the knowledge of any Diſeaſe.

Urines brought from ſick perſons ſometimes are wholly like thoſe of ſound peoples, and then they give no light to the diſeaſe or diſtempered part; but it may be lawful, having inſpected them, to ſay ſomething negatively, *viz.* that the Patient is free from a Fever, that as to the Ventricle and Concoction of the food, they are indifferently well: wherefore unleſs he be inclining to a Conſumption, or is ſick of an Impoſthume, or ſome other diſeaſe of the unity being broken; whatſoever it be, the diſtemper ſeems not very dangerous or hard to be cured.

But in the mean time I would not have him declare any thing raſhly, nor proceed farther than he can with ſafety return: for I have often obſerved in ſome moſt grievous diſtempers, *viz.* in a malignant Fever, when with loſs of ſtrength, a weak and unequal Pulſe, eruption of Spots, and other dangerous Symptoms, the Patients have been deſperately ſick, that the Urines as to the colour, conſiſtence, and Hypoſtaſis, have been laudable, as in ſound perſons, ſo that in ſuch a caſe the Phyſician by only viewing the Urine, as to his Prognoſtication had grievouſly erred: wherefore there is ſcarce credit to be given to the ſingle teſtimony of the Urine, unleſs there be other ſigns agreeable; but that it is a lyar in the Plague and malignant Fevers, and deceives: the reaſon is, that in thoſe diſeaſes the blood is leiſurely, and as it were ſilently corrupted, ſometimes without any great fervour: and ſo, although its liquor be infected by Coagulation, or by mortification or deadneſs; yet becauſe it doth not burn out much at the ſame time, ſo as to make an heap of aduſt matter, as of Aſhes, the Serum is little or nothing altered from its uſual diſpoſition or tenour: Beſides, ſometimes when in ſuch a ſickneſs the blood grows very hot, whatever of excrementitious is heaped up in its maſs, is preſently transferred to the Brain and nervous ſtock: wherefore the ſerous water being free from preternatural contents, remains after its uſual manner; beſides this caſe, when the Urines appear of a deep colour, troubled, and without any ſediment, there is no reaſon why the Piſs-prophet ſhould make a Prognoſtication.

As often as the Urines of ſick people are unlike thoſe of ſound, either ſomething natural is wanting, or what is preternatural is added, or it happens both together.

1. There may be wanting Colour, Conſiſtence, Contents, and Quantity. If the Colour be more remiſs than it ſhould, and the Liquor paler, it indicates Crudity, and a defect of making Spirits, to wit, that the nouriſhing Juyce is not rightly concocted or exalted either in the Viſcera or in the Veſſels; ſo that the ſaline and ſulphureous Particles being carried out together, following the diſtribution as it were the diſtillation of the Serum, might throughly ſtick to the ſame, and impart alſo to it the tincture: wherefore ſuch Urine being viewed from theſe kind of Symptoms, you may unfitly divine, that there is a weight in the Ventricle, want of Appetite, evil Digeſtion, a tenſion in the Hypochondria, an unfitneſs for motion, ſleepineſs, difficult breathing, and a frequent palpitation of the Heart upon exerciſe, a pale colour, a ſwelling of the Feet and Belly, you may ſay they are in danger of falling (if not already fallen) into a Cachexy or Dropſie, and if it be a Maid, that ſhe is troubled with Longings and the Greenſickneſs.

If the Colour of Urines be remitted in a Fever without a Criſis, it is a ſign that the fermentative matter or aduſt recrements of the blood are ſeparated from the boſom of the blood, and fixed ſomewhere, which for the moſt part happens in the Brain; and for that cauſe ſuch Urines uſe to foretel a Delirium or Phrenſie; in thoſe troubled with the Stone, a ſudden alteration of the urine into a pale and watry colour, denotes the approach of a Fit.

A copious and pale Urine often ſhews the too great reſolution or melting of the Salts, by reaſon whereof the ſeroſities are ſent away as it were in a flood from the whole body, and chiefly from the nervous parts; ſuch an Excretion ſometimes is healthful, and as it were critical, when the ſuperfluities happen only to be carried away: ſometimes it is ſymptomatick, and cauſes a great debility, to wit, becauſe the nutritious Juyce and the good humours are purged out.

If the Conſiſtence be thin, and the Liquor pale, it argues Crudity, want of Spirits, or too much Drinking, or the Nephritick diſtemper: if it be of a flame-colour, it is a ſign of an intermitting Tertian Fever.

If the Contents be wanting, and it be pale, want of Concoction is ſignified, and a Cachectick diſtemper of the body. But if it be of a Citron colour, and the conſiſtency mean, without Hypoſtaſis, you may ſuppoſe the Patient to have uſed too much labor or exerciſe; or to be frequently diſtempered with Sweats in the night, or perhaps to have an Atrophy, or general waſting, or to be inclining to a Conſumption.

If the Urine be continually made in a leſſer quantity than it ſhould, unleſs there be a larger tranſpiration, it is a ſign that the blood is not ſufficiently purged from the ſerous Juyce: wherefore there is a neceſſity that it become more watry, and that at length a Cachectical diſpoſition of the body, or a Dropſie be brought in. But if it be ſuddenly ſuppreſſed, or made with pain and difficulty, it is a ſign of the Stone or Gravel.

2. Something is added to the Urine, to wit, when the colour is heightned, and in the mean time the conſiſtency and contents ſhew themſelves in due meaſure, there may then be a ſuſpicion of a Feveriſh or Hectical diſtemper: perhaps ſome evident cauſe may precede, as the uſe of Baths, Heat, Surfeit, or immoderate Exerciſe, which might have heated the blood; or Cold may have heedleſly been taken, whence may ariſe a ſhutting up of the Pores, and difficulty of Perſpiration. If the Urine be of a Saffron-colour and tinges the Linen with yellowneſs, you may ſay it is the Jaundice: but if it be of a Saffron-colour or red without a Fever, and doth not dye Linen, it ſhews for the moſt part the Scurvy or Hypochondriack diſpoſition.

Though the Colour and Hypoſtaſis may be in good order, preternatural Contents are often in the Urine; therefore when it grows cold it is troubled, and makes a ſediment ſometimes white, and then there is a ſuſpicion of the blood's overflowing with filth, alſo of an impure Ventricle ſtuffed with excrementitious matter, or with Worms; ſometimes red, which often happens by reaſon of Tranſpiration being hindred, a Conſumption, and ſometimes by reaſon of a Surfeit, or the beginning of a Fever.

Preternatural and thicker Contents are ſometimes in Urines, ſhewing themſelves naturally, which denotes a diſtemper of ſome part about the urinary paſſages; whence Matter, Filth, Blood, the Whites, corrupt Seed, or the like, are mixed with the Urine: and you may eaſily know by asking how, and in what place the Patient is ill, what part is diſtempered; and the ſtraining the ſediments of thoſe urines will ſhew what the diſeaſe is, and you may be more ſure of the nature of the diſtemper.

When Urines have ſtood ſome time, copious white ſediments are thence made; it is not eaſie at firſt ſight to know from whence they come, *viz.* whether from the whole maſs of blood, or only from a particular bowel imployed for the preparations of the Serum or the Seed. For the impurities of the blood and nervous juyce being depoſited under a mealy ſpecies in the bottom of the Urinal, are wont to cauſe a ſuſpicion in the Phyſician of the Whites in Women, and of the Running of the Reins in Men: ſuch like contents are alſo ſeen in Urines, which proceed from the urinary and ſpermatick parts. Amidſt theſe ambiguities, leſt you ſhould gueſs raſhly and confidently by the Urine, and aſſert uncertain for certain things, and falſhood for truth, the difference of theſe kind of Urines ought to be indicated after this manner. If the contents be univerſal, and their ſigns be to be applied to the maſs of blood; for the moſt part theſe preſently after the making (unleſs ſometimes by chance in a Critical ſeparation) are wholly inconſpicuous (as in a thinner ſubſtance,) then the Urine being troubled by cold, they deſcend ſlowly to the bottom; and being ſetled, and the Urinal heated, they diſappear again. But if theſe white ſettlements are ſent from a particular neſt, they preſently diſturb and thicken the Urine newly made, are ſoon precipitated, and vaniſh not by heat. But that it may appear to what bowel theſe kind of particular contents ſhould be aſcribed, 'tis eaſily made known to Learned men by other circumſtances.

3. The Urine is ſometimes wholly altered from the natural ſtate; the colour and contents which ſhould be therein are wanting, and ſtrange things are in their place; then indeed is indicated that there is an intemperance in the whole body, and that the Concoction in the Bowels and Veſſels is depraved, you may ſay the Patient is ſick of a Fever; and thence by asking, you may learn and preſently pronounce that he is diſtempered with the Head-ach, Thirſt, Heat, queaſineſs of Stomach, want of ſleep, and by conſequence with other Symptoms.

It happens ſometimes, that the Urine declines from its natural ſtate, yet not to ſhew the diſtemper the Patient complains of, but either the cauſe of the diſeaſe, or the conſent of ſome other part with the diſtempered; as if any one ſhould complain of a cruel Head-ach, or trembling of the Heart, and make a watry Urine, that doth not denote thoſe diſtempers, but only a crudity in the Ventricle, and ſome obſtructions about the Spleen and Viſcera, which may be the cauſe of thoſe diſtempers: I ſay in this caſe, the Urine being inſpected, the chief indications are taken about the Method of Curing, and we muſt not uſe Cephalick or Cardiack Remedies, but either Catharticks, which cauſe Vomit or Purging, or Openers, and eſpecially Calybeats: But the Urine is ſometimes vitiated, and yet its ſignification is wholly a ſtranger to the diſtemper the Patient complains of, as if any one were ſubject to the ſleepy diſeaſe, or a Lethargy, and makes it red and full of preternatural contents, its inſpection ſuggeſts chiefly coindications, *viz.* that we inſiſt not on too hot, but temperate Remedies.

The chief uſe of Inſpection of Urines will be for the obſerving the ſtate and progreſs of every diſeaſe, as alſo the alterations towards health or death. For in Chronical diſeaſes, by daily inſpecting the Urine, is made known to the Phyſician, by what degrees the ſickneſs may increaſe day by day; at what time purging or altering Remedies will be moſt fit, and what Medicines will be moſt profitable; hence is to be obſerved, whether Nature prevails on the diſeaſe or not; and a moſt certain Prognoſtication may be drawn from hence, either of the hope or danger of health; to wit, according as the ſigns of Concoction or Crudity appear in the Urines. In acute diſeaſes, hence the ſtate and height of the Fever may be beſt known, at what time the Criſes may be expected, and with what ſucceſs: when it is beſt to inſiſt upon Evacuations, and when on Cordials. The Compaſs is not beheld with more certainty and diligence by

by the Mariner or Steers-man, than the appearances of Urines ought to be obſerved by the Phyſician for fit times and ways of Curing.

Theſe were what I had to ſay concerning the Judgments of Urine, not collected from the vain Traditions of Quacks, but what are conſonant to reaſon and truth. Beſides I know there are ordinarily delivered by Medicaſters and Old women almoſt an innumerable company of Rules and Directions of Urine-divination, that the Urinal is no ſooner inſpected, but they will undertake to divine, whether it be a man or a woman that is ſick, how long they have been ſick, what their diſeaſe is, and whether the diſtemper ſhall end in health or death; whether the Patient be ſubject to the paſſions of Love or Sadneſs, whether a Woman hath conceived with Child or not, or whether it ſhall be a Boy or a Girl, and an hundred other the like; in which uſing a vain conjecture, they either impoſe by their confidence on the minds of the credulous, or (which is more frequently their cuſtome) by a cunning craftineſs they otherways ſift out the matter by inquiring, and falſly aſcribe it to their knowledge in the inſpection of Urine.

CHAP. VII.

Of the Examination and various ways of proving of Urines.

ALthough the buſineſs of the Examination and Inſpection of Urines ſeems commonly only a ſimple thing (*viz.* the Medicaſters and Quacks for the moſt part behold the Urine ſent in a Glaſs, ſhake it a little, and preſently give Judgment) yet to thoſe who honeſtly endeavour the recovery of the ſick, the matter ſeems a little more intricate, and they uſe to obſerve ſeveral circumſtances concerning Judgment by Urine; which being omitted, nothing indeed can be certainly or directly learnt in the Medicinal Practice from the Urinal. Moreover, in ſome diſeaſes, beſides the mere inſpection of the Glaſs, there are other ways of tryal to be had, by which, what lies hid in the Urines, and out of ſight, may be made clear: from whence ſome not unprofitably taking care of the ſeparation of Urine more accurately, have uſed to evaporate, diſtill, putrifie, and precipitate them. Wherefore we ſhall ſpeak briefly of the right manner of inſpecting Urine, and in ſome caſes of the Analyſis or ſeparation variouſly to be inſtituted.

When the Urine of the Patient is offered to the Phyſician, if it hath firſt ſtood for ſome time in the Glaſs, and if the liquor be clear, the Hypoſtaſis is as it were gathered into a little cloud, and if the reſt of the contents ſink down to the bottom, there is nothing more wanting, but that forthwith a prognoſtick ſentence may be given. But if the Urine be newly poured into the Urinal, or be troubled by a former ſhaking, you muſt ſtay till the confuſed parts be ſeparated, and the ſettlement have acquired its due place. If the Liquor be full of contents, and the Pores ſtraitned, it becomes troubled and dark, and the Glaſs muſt be put in a warm place, till the Urine grow clear again, and then let it be placed for ſome time near the fire, that whilſt the preternatural or more thin contents are abſorpt by the Pores dilated by the heat, the more thick may fall down to the bottom, and the filaments or little rags making the Hypoſtaſis, (if there be any) may be gathered together below, or in the middle region; for ſo will appear what is the power of Nature, and what of the Diſeaſe: Alſo in Fevers, the degree of heat and effervеſcency, the concoction or depravation of the nutritious Juyce, alſo the congeſtion or heaping together of the aduſt matter in the blood, and its ſeparation begun, or wholly fruſtrated, may ſomewhat appear by the ſignification taken from Urines; wherefore you ought to proceed after this manner, when the urine is brought from far, to wit, whoſe Particles are diſturbed by much ſhaking, unleſs it be kept for ſome time in a warm place, they will not eaſily get again their due place of poſition. But if you often viſit any Patient that keeps his bed, it will be convenient, that the urine newly made, and put into an Urinal, be placed near a Stove, where, whilſt it grows moderately hot, the ſeveral parts may, after the beſt manner, be diſpoſed to a ſettlement without any trouble or diſturbance.

Afterwards the Urine thus naked, and as it were diſrobed from any covering, is offered to the ſight, the next caution will be, leſt any of its Phænomena or appearances being accidentally contracted, and not properly belonging to it, may impoſe upon the Phyſician; which indeed ſometimes happens, by reaſon of alterations cauſed in them by food taken, and which chiefly conſiſt in the colour and ſmell of Urines, being variouſly changed beſides Nature, and the expectation of the Phyſician.

For it is an errour commonly committed, when the Urine being yellow, and tinging the linen by the taking of Rhubarb, Saffron, Sanders, and the like, undoubtedly to believe it a ſign of the Jaundice; alſo the urine being imbued with blackneſs by the taking of Caſſia, to attribute it to the melancholick Tumor or black Bile; alſo when the urine is deep colour'd by taking of Pulſe-broth, or a Decoction of Madder, or other drinks, we falſly ſuppoſe it to indicate a feveriſh intemperance. It often happens from the drinking plentifully thin liquor, the urine is leſſened of its high colour beyond expecta-

tion, and heightned by the drinking of ſtrong drink or hotter things: unleſs the Phyſician take notice of theſe kinds of mutations, he will give but a falſe Judgment concerning Urines by looking on them. When therefore the colour is changed in the Urines without any manifeſt cauſe, the manner of living muſt be inquired into, if that the alteration proceeds from what is eaten or drunk, that it may not be wrongfully aſcribed to the diſeaſe. A queſtion will here ariſe, why foraſmuch as moſt things taken in at the mouth, before they go into urine, wholly loſe all their colour; which being eaten, ſo pertinaciouſly impreſs a tincture to the Serum, that they paſs untouched through all the ſtrait turnings and windings of the paſſages? The reaſon or cauſe of which conſiſts chiefly in this, that ſome mixtures have the conſtitutive parts of their colour or dye very ſubtil, and thoſe highly volatile; wherefore theſe being taken only in a ſmall quantity, dye the whole maſs of the Chyle with their colour; and from thence the nutricious Juyce conveyed to the blood, aſcends coloured, and its vehicle, *viz.* the ſerous Latex, is ſent away ſtill dyed or tinctured.

What the odour of Urines of ſound people may be, is obvious to every one that can ſmell, *viz.* whilſt it is freſh made, it is not very ungrateful, by reaſon of the ſulphureous and ſaline Particles bound up in the ſubſtance of the liquor; when it hath ſtood ſo long, that the Sulphur begins to exhale, ſharpned with the Salt, the mixture being looſned, it putrifies and ſtinks grievouſly. Beſides we may obſerve, that ſometimes there ariſes from urines freſh made, a ſweet odour like Violets, and ſometimes they offend the noſe with a very ungrateful ſtink. The former doth not depend either on an healthful or unhealthful condition of the body, but is produced only from things taken: Turpentine, Nutmeg, and other Gumms and Spices taken in at the mouth, though of a diverſe nature and operation, impart a like ſuavity or ſweetneſs to the urine. The reaſon of this ſeems to be, becauſe in theſe kind of mixtures very many particles of the purer Sulphur (that is imbued with Spirits) are eminent; which, for that they are volatile, being confuſed with the Serum, are not contained in the bond of the mixture; wherefore the urine being made, theſe alone leap out, and not accompanied with others of the ſtinking urine, and ſo diffuſe a grateful odour; which, although it proceeds from divers kind of things eaten, yet remains ſtill after the ſame manner like Violets, for that in all, thoſe ſulphureous Particles are ſet free by digeſtion from the others joyned with them in the ſame concrete, nor are infected by different ones from the urine. But as to what reſpects the ſtinking urine, that ſometimes proceeds from an Ulcer about the Reins, Bladder, or urinary paſſages; ſometimes alſo it is raiſed from a too hot intemperance of the Reins, or of the whole Body; for when the Sulphur is deeply boiled in the Serum, its particles being ſharpned by the Salines, (for that they are leſs cloſely ſhut up) do preſently evaporate, and grievouſly affect the ſenſe of ſmelling; but beſides, ſometimes urines contract a ſtink from things eaten. For the Balſam of Sulphur, Garlick, Aſparagus, Cider, Rheniſh Wine, and many other things taken at the mouth, do cauſe a ſtrong ſmell in the urine. If the reaſon of this be demanded, we ſay that ſuch things which impart a ſtink to the urine, alſo provoke it in a more plentiful quantity: wherefore it ſeems that theſe ſort of things being taken, fuſe the blood, and greatly haſten the precipitation of the Serum; and when by this means the ſerous Juyce is pulled away as it were abruptly from the blood, the frame of the liquor is made lax, nor are its parts exactly mixed, nor contained in an equal bond of diſpoſition: wherefore when this urine is made from the body, its frame or ſubſtance being before looſned, the particles of the more groſs Sulphur (that is combined with Salt) preſently breathe out, and ſo diffuſe a ſtinking ſmell. For urine thus altered by things taken, ſeems very like to Lye, wherein Antimony or common Sulphur is boiled, and is afterwards inſtilled into ſome acid thing, becauſe in this Decoction, as alſo in ſuch ruine, the frame of the liquor being unlocked, the little ſulphureous bodies leap out, and affect the ſenſory with a ſtinking ſmell.

If that any one more curious in the ſearch of Urines, ſhall ſeek further than the examination of the ſight and ſmell, he may eaſily, by a divers manual operation, reſolve them into parts, and as it were diſſect them to the life, and thence draw Medicinal directions of no ſmall moment; for that in many Chronical diſeaſes where the Dyſcraſies of the blood are more exactly to be ſought into, that the proportion and temperature of Salt and Sulphur may be truly found in it, it is ſometimes convenient to evaporate urines, or to diſtil them, ſomething alſo is to be learned from them, being precipitated, or looſned by putrefaction. I knew an honeſt Woman greatly afflicted with a ſcaly filthineſs of the skin, which ſhe was wont to ſcratch off in great plenty, as it were a branny matter. Her urine being evaporated in a little Skillet, left ſticking to the ſides of the Veſſel, a cruſty and ſalt ſediment, like the excrement of her skin. Not long ſince I evaporated the urine of a Gentleman, grievouſly ſubject to convulſive motions and painful ſtretchings out of the Muſcles, in the bottom of which there remained a quantity of ſalt and tartarous matter, exceeding the weight of half the liquor. By this means it will be an eaſie thing to find the proportion of the ſaline Principle in the blood and humours: but whether this Salt be volatile, or becomes fixed beyond meaſure, the diſtillation of the urine will preſently ſhew; For if the Spirit (ſo called) be copiouſly drawn out of the urine, and that beſides the Salt aſcends into the Alembeck, it is a ſign of volatilization: but the contrary to this argues the fixity of the Salt.

As the evaporation and diſtillation of the Urine ſhew the power of the ſaline Principle, ſo the precipitation, putrefaction, and Sulphur lay open the thicker contents of the Urine, as it were in weight and meaſure. As to the former, although the liquor of the urine be ſalt, and often big with contents, yet for as much as its ſaline Particles are not (as it is wont to be in moſt Menſtruums) either wholly in a ſtate of

fixity,

fixity, or of flux, but for the moſt part volatile, therefore it is not eaſily nor preſently by any ſalt infuſion ſubject to putrefaction; the Spirit of Vitriol and other acetous things effect nothing: the Salt of Tartar ſtirs up a little peturbation. But the ſolution of Alum, for that it greatly conſtrains into a little ſpace, preſently diſturbs the whole liquor extreamly, and delivers all the contents of the urines, as they were thruſt out of their dens, to be ſeen openly by the eyes. Wherefore by this means, without any long ſtay for ſettlement, you may preſently know how much of ſulphureous and earthy matter is depoſed from the maſs of blood for excrements in the bottom.

The putrefaction of Urines is wont to exhibit the ſeveral particles of every kind, yet more diſtinct, and diſpoſed as it were by themſelves; for if the urine be left to ſtand unmoved for many days in the Glaſs, the colour, odour, and conſiſtency will be very much altered; for the colour will be deeper, the ſmell ungrateful, and highly ſtinking; the conſiſtency thicker, and will have on the ſuperficies a downineſs or hoarineſs, ſometimes whitiſh, ſometimes bluiſh; there will be alſo fixed in the bottom of the Veſſel a thick and copious ſediment, and often on the ſides a ſandy or tartareous crull, of a whitiſh or Aſh-colour. From theſe kind of appearances, and as the urines ſooner or later putrifie, and ſo are more or leſs altered from their formet ſtate, it may be conjectured what the proportion of Salt or Sulphur may be, whether of them exceeds the other: alſo no unfaithful Judgment of the quality and plenty of the earthy matter or the contents may be taken from hence.

And thus, Sir, at length you have the Doctrine or Method of Separation of Urine, ſuch as our unskilfulneſs hath rendred it: I deſire you would be pleaſed not only to pardon the errours and barrenneſs of this Diſcourſe, but alſo to excuſe it in other things, becauſe at firſt writ by your perſwaſion, and then by your command and requeſt made publick. Wherefore pray take care of this child hardly brought forth and almoſt an abortive, and as it were expoſed and deſervedly laid at your door, without portion. Farewel.

Two

TWO

Physical and Medical EXERCITATIONS,

VIZ.

I. Of the Accension of the Blood.
II. Of Musculary Motion.

THE FIRST

Medical and Physical

DISCOURSE

Of the growing hot or inkindling of the Blood.

IT is long since I designed to Print my Meditations concerning the remaining Pathology of the Brain and Nervous stock: But when many Diseases of that kind affect the animal Spirits, and not rarely the whole Hypostasis of the corporeal Soul more immediately than the Humors or solid Parts; I therefore thought it necessary first to publish the Disquisitions of the nature of this Soul, and its manner of subsisting, and also of its Parts and Powers, that from these things rightly known, its preternatural Passions may at length be the better discovered. But concerning these very hard matters, and difficult to be unfolded, when I had begun to frame (as I think) probable and rational Arguments, I saw well they would be looked upon and laughed at by some as unusual things and Paradoxes; which indeed it becomes me not to take ill, but to let every one freely to enjoy his own sense, and to use in all things his own opinion and judgment. Among the many things conjecturally proposed by me, (which I could not avoid) two chief Arguments are opposed, to wit, that I had affirmed, that the blood for the continuing of life was inkindled, and that the animal Spirits, for the motive act, were exploded: which terms, though perhaps they may sound rough and strange to be applied to the animal œconomy; yet if any one shall weigh the Reasons and Arguments which do perswade to the truth of either opinion, I doubt not, but that there will be none who will not give their assent, or easily pardon me for mine. In the first place therefore, because there are so many opinions concerning the growing hot of the Blood, for that some attribute it to an innate heat, others to a flame in the Heart, some also to a fermentation of the bloody mass, and others to its inkindling; therefore I shall endeavour more narrowly to introspect the matter, and as much as I am able, to build upon a more certain Ratiocination, its genuine Cause, though very abstruse.

We

We have formerly diſcourſed concerning that Soul, which is common to the more perfect Beaſts, with that ſubordinate or more inferiour of Man, and have ſhewed it to be indeed Corporeal, and to conſiſt of two parts; the one of theſe rooted in the blood we called a Flame, and the other dwelling in the Brain and nervous ſtock, Light. As we ſhall here only treat of the former, I think it will be no difficult matter to make uſe of the ſame Reaſons and Inſtances, which truly conclude, or at leaſt very like truth, that in the firſt place the blood is animate or hath life: Secondly, that this Animation is in its accenſion or inkindling, or conſiſts in an affection moſt analogical to this.

1. Not only the opinions of Philoſophers, but the undoubted teſtimony of the Sacred Scripture plainly aſſerts the animation of the blood: to wit, the uſe of blood was forbidden in the Moſaical Law, for this reaſon, becauſe the Blood is the Life or Soul; which is alſo apparent by the obſervation of the moſt famous *Harvey*, for that its motion is to be obſerved by the eye, ſhews that it firſt lives and laſt dyes. For the greater proof of this, it is commonly known that Animals only live ſo long as the blood remains in its due plenty and motion; and that they preſently dye, if either too great a quantity of this be taken away, or its motion ſuppreſſed.

But as to the ſecond Propoſition, to wit, that the life or ſoul of the fervent blood depends upon its inkindling; this will appear probable, if I ſhall ſhew: Firſt, that the liquor of the blood ought to be very hot in the more perfect living Creatures. Secondly, that this growing hot can be produced or conſerved in the blood by no other means beſides accenſion or inkindling. Thirdly, that ſome chief affections, as it were proper paſſions of fire and flame, are agreeable to the life only of the blood growing hot. Fourthly and laſtly, theſe being clearly ſhewn, ſome other leſs ſignal accidents and properties, in which common flame and life agree, are added, and alſo we will unfold how and in what reſpect they differ among themſelves.

As to the firſt we affirm, that the blood is perpetually moved in all living Creatures; beſides in the more perfect it doth eſtuate or grow hot in act. Indeed its undiſcontinued motion is required, both for the conſervation of the diſpoſition of the blood it ſelf, whoſe liquor would otherwiſe be ſubject to ſtagnation and putrefaction, as alſo that being carried about in the whole body, it might be able to give a due tribute to all parts. For that the offices of the blood, at leaſt in the more perfect living Creatures, are divers and manifold, *viz.* to inſtil matter in the Brain and nervous ſtock for the animal Spirits to diſpenſe the nutritious Juyce into all the ſolid parts, to ſuggeſt to the motive parts an elaſtic Copula, and beſides to ſeparate all recrements and worn out Particles, and to put them aſide into convenient Emunctories.

But although the meer motion of the Blood in leſs perfect Animals, or at leaſt its moderate ſwelling up, ſuch as may be perceived in Wine and other Liquors agitated into Fermentation, is able to ſuſtain and perform the œconomy of Nature; to wit, for as much as both a crude nutriment is every where received from the river of the blood, though cool, continually flowing into all parts of the whole Body, and that fewer ſpirits and more thick, as it were ſeparated by percolation or ſtraining, enter the Brain and nervous ſtock with that plenty, that may ſuffice for local motion, and the Organs of the few ſenſes to be rudely actuated: yet the blood watering the bodies of more perfect Animals, require offices of a far more excellent kind; for it ought not only to be carried about with a continual and more rapid motion, but very much to ſwell up, yea actually to grow hot or effervent, to wit, for that end, that its frame or ſubſtance being very much looſned, it may more copiouſly ſend forth the reſpective Particles of various kinds, every where falling off from it, and may diſpoſe them here and there for the uſe and wants of Nature.

But firſt, for that the animal Spirits are continually to be ſupplied in great plenty from the maſs of blood, and that there is need for the elaſtic Particles requiſite for the locomotive function, to be thence perpetually poured into all the Muſcles, it ſeems very neceſſary that the liquor from whence theſe generous and manifold ſupplements are drawn ſhould be actually hot, or rather ſhould burn forth; to wit, that the aforeſaid Particles, not ſufficiently to be unlocked but by heat or burning, ſhould freely run out from the ſubſtance or frame of the liquor, which truly is manifeſt, becauſe from Wine, and alſo from the ſame bloody Liquor, and all other ſpirituous things, a ſubtil and ſpirituous humour is copiouſly drawn, but not to be performed by diſtillation without heat or fire. Yea the ſulphureous Particles, although they are leſs apt to be exhaled from any liquor, yet they moſt readily fly out by inkindling the ſubject. By theſe there is an apparent neceſſity of the blood's growing hot for the perfection of the animal as well as vital function: but that it may appear by what means this is done, to wit, whether by Accenſion, or by Fermentation, or by any other way, we ſhall firſt in general inquire, by what means, and for what cauſes any liquid things are wont to grow hot; then we ſhall conſider, to which of theſe the growing hot of the blood ought to be attributed.

Concerning theſe we ſay, that there are only three ways, or ſo many kinds of cauſes, by which Liquors conceive a heat, *viz.* firſt, by fire or heat being put to them, as when water is made to ſeeth or boil over the fire, or that it grows hot by the heat of the Sun, a Bath, or Stove, or by the diſſolution of quick Lime: inſtances of all which are commonly known. For the ſame reaſon Bath-waters ſeem to boil. For that we may inſtance in our own Baths, to wit, they are impregnated neither with Sulphur nor fixed Salt, as I have plainly experimented, by diſtilling and evaporating them, and by pouring into them precipitating Liquors; yea by diſſolving them with Sulphur, and many other ways. They moſt reſemble Lime-water, and they, as we believe, grow hot from a like cauſe, to wit, by imbibing the fiery little bodies

ſome-

ſomewhere hid within the Earth. Of theſe, unleſs it had been ſuperfluous, we had here given a fuller deſcription, which may perhaps be done at ſome other time. Secondly, when ſaline Corroſives, which are of a diverſe kind, being mingled with themſelves, or with ſulphureous things, work mutually one on another with a great ſtrife and agitation of Particles, and oftentimes excite heat, yea ſometimes fume and flame; as when the Spirit and Butter of Antimony are poured to, or mixed with ſtygian Water, wherein lixivial Salts are melted, or with Oyl of Turpentine, or other diſtilled things: beſides when corroſive Liquors eat Metallick Bodies, they often grow hot. Thirdly, and the only way beſides (as I ſuppoſe) whereby a liquid thing is made hot, is when any humour, being very much imbued with Sulphur or Spirit, conceives a burning by putting a flame to it, and ſo grows hot by burning forth. This is ordinarily ſeen in oily or very ſpirituous Liquors, being inkindled and inflamed.

There remain indeed ſome other ways of Calefaction, to wit, Fermentation, Putrefaction, and Attrition, whereby more thick Bodies, or Solids, often conceive a fervour, but they produce not ſuch an effect in Liquids; whilſt the mealy Maſs or Dough is fermented, the active Particles being ſtirred up into motion, unfold themſelves on every ſide, and lift up the bulk or ſubſtance of the ſubject; in the mean time, for as much as the ſulphureous Particles being agitated with them, take hold one of another, and begin to be combined, a certain heat, though more remiſs, is excited; in like manner from Putrefaction, Dung or wet Hay get an heat, to wit, for as much as the ſulphureous Particles, within included, are very thickly heaped up together, then being combined together, they break out in troops; yet no Liquors, either thin or thick, whether they ferment or putrifie, do for that reaſon at any time grow hot; For wines, whilſt infermenting they break in pieces the ſides of the Tun, or overflow the top of the veſſel with a great noiſe and ebullition, do not actually grow hot, yea not ſo much as grow warm. The blood being let out of the Body, and placed in convenient Glaſſes, either to ferment or putrifie, doth not get any actual heat; yet in truth we grant the Blood in living Creatures to be fermented, and by fermenting to be putrified, yea and ſome other offices of the animal œconomy to perform the ſame: moreover, we have formerly ſhewed from its Fermentation being hindred, or too much increaſed, or otherwiſe depraved, divers kinds of diſeaſes to be produced: yet we deny the heat of the blood to be excited by Fermentation. Becauſe neither the blood of more frigid Animals, nor Wines, nor any other Liquors, though agitated with the higheſt Fermentation, are for that reaſon actually hot. And indeed the reaſon ſeems evident enough, to wit, becauſe the ſulphureous Particles being raiſed up in the more thick ſubjects, though they lay hold on one another mutually, and being more thickly heaped together, raiſe up heat: yet in Liquids, the ſame kind of Particles, however ſtirred up or agitated, are immediately disjoyned by the watry coming between, and are hindred from their mutual embrace and combination; ſo that they cannot of themſelves produce an actual heat; For the ſame reaſon, hard bodies being rubbed one againſt another, or violently knocked or bruiſed, do not only produce heat but oftentimes fire; when as yet Liquids, however ſhaken and agitated, do not grow warm. Therefore as there are only three ways, whereby actual heat may be begotten in all Liquors, we ſhall inquire to which of theſe the heat of the Blood may be aſcribed.

Firſt, Some ſay it is the firſt way, from the opinion both of the Ancients, and of ſome of the Moderns: the Blood is ſaid to grow hot, by reaſon of ſome hot thing put to it, to wit, whilſt thoſe affirm an innate heat, and theſe a little flame to be placed in the Heart, and to heat the blood paſſing through it; but either of theſe opinions eaſily fails, from which it is clear, that the Heart is a mere Muſcle, nor doth contain in it ſelf any tinder or matter for a flame or heat (I know not how) implanted, fit for their continuance. For though it be confeſſed, that on the continual motion of this Bowel, (which is only animal) the Circulation of the Blood doth depend, yet the Heart borrows heat altogether from the blood, and not the blood from the Heart.

Secondly, as to what reſpects the ſecond way of making hot a liquid thing, to wit, whereby a great heat is excited by the mixing of ſaline Corroſives together, or alſo oily, or by corroding a metallick Body, I think there is none that will ſeriouſly aſſert, that the blood grows hot from ſuch a cauſe; for that its liquor, in its natural ſtate, is always homogene, and although it be ſtuffed with plenty of Salt, it is however with that which is volatile, gentle, and benign only; But there is not to be found, either in the heart or any other place a ſaline or any otherwiſe heterogene Mine, whereby the bloody liquor, by working or corroding, may get or conceive an heat; to wit, it behoves either ſuch a Mine or the Body to be corroded, to be perpetually renewed, becauſe the ebullition and heat raiſed up by the ſtrife of Salts, ceaſes as ſoon as the Salts are combined, or the Body corroded. If at any time the ſaline Particles of the humours in our Body depart from their right temper, and become enormous and unbridled, for that reaſon the blood as to heat and motion, enters into ſome irregularities; yet it ſeems impoſſible, that it ſhould originally and perpetually become hot by the congreſſion, and ſtrife, or corroſion of the Salts.

Thirdly, As to the third way, whereby Liquids are made hot, though it may ſeem an uncouth ſaying, That the blood is ſo inkindled, yet ſince we cannot attribute it to any other way beſides, what ſhould hinder from attributing its heat to this Cauſe? And the rather, for that the proper paſſions of Fire and Flame are agreeable to the life of the Blood alone.

For indeed theſe three things are chiefly and principally Eſſentials, requiſite for the perpetuating flame. 1. That there be granted to it, as ſoon as it is inkindled, a free and continued acceſſion of the Air. 2. That it may enjoy a conſtant ſulphureous food. 3. That its recremens both ſooty, as alſo the more thick, be always

always ſent away. So then if I ſhall ſhew theſe things to agree after the ſame manner with life, as flame, and to thoſe only, without doubt, I think that life it ſelf may be eſteemed a certain kind of Flame.

In the firſt place therefore, that a flame may be inkindled, and remain inkindled, there is need of a free and undiſcontinued acceſs of Air, and that not only, that the vaporous Effluvia's, threatning the ſuffocation of the flame, may be carried away, and always depart, but much rather, that the nitrous food neceſſarily requilite for the burning of any thing, may be ſupplied by the Air. For indeed every ſublunary fire, and eſpecially flame, is compounded or made up altogether of ſulphureous Particles, breaking out in heaps from a combuſtible Body, and of nitrous Bodies, which every where flow in the Air, meeting with them: when Particles of Sulphur, breaking out ſlowly or interruptedly, get to themſelves a few nitrous, only planted near them, a fire is uſually produced, ſuch as is ſeen in a burning Coal: But when the former going away more impetuouſly, either of their own accord, or forced by blowing, preſently lay hold on very many nitrous Particles flowing round about in the whole circuit, a flame ariſes. In truth the whole region of the Air is abundantly ſtuffed with nitrous little bodies, which are every where ready for the conſtituting of fire and flame, and they being any where inkindled, meet them after the manner of a flood, although not always after the like manner or meaſure, becauſe it is obſerved at ſome times, eſpecially in the Winter-cold, when the Air abounds more in Nitre, that fire or flame doth more ardently burn, and diffuſe farther its heat: on the contrary, in rainy weather, as alſo when the beams of the Sun ſhine upon the fire, and ſo diſſipate the Nitre of the neighbouring Air, the fire is ſo dull'd, as is commonly ſaid, that it is extinguiſhed by the Sun. If at any time the nitrous Particles of the Air are excluded from the ſulphureous of any ſubject breaking out in the inkindling or burning, the fire and flame quickly periſh; which appears, becauſe this or that being put into a Glaſs, after the Air is ſucked out or excluded, they preſently expire. Further, in the open Air, although a naked fire propagates a fire in a fireable matter by mere contact, yet a flame is hardly inkindled without a flame be put to it, or a very ſtrong fire: becauſe, for the ſtirring up of a flame very many nitrous Particles of the Air, implanted round about, ought to be inkindled at once; as if Nitre and common Sulphur being pounded together, be commixed (becauſe both Incentives agree) even the leaſt ſpark falling into ſuch a mixture begets an highly impetuous flame, which deſiring no farther a nitrous food, is inkindled or burns under water, in a place void of air, or in any place as freely as in the open Air. In like manner, the leaſt ſulphureous things, as a bit of ponderous wood, being caſt into a red-hot Crucible, in which Nitre is fuſed, the ſame at firſt touch preſently conceive a flame, and continue till it be wholly conſumed: But that fire and flame being included in a place empty of air, expire by reaſon of the food of Nitre being drawn away, rather than choaked by their own proper ſmoke, the Illuſtrious Mr. *Robert Boyle* hath moſt clearly demonſtrated by very many Experiments. For a Candle being lighted, and put into a capacious globe of Glaſs, and the Veſſel ſtopped up: aſſoon as the air was ſucked out by a wind-inſtrument, the flame did expire. *Exper. Phyſ. Mec.* 50. Moreover, he obſerved, what concludes for our Hypotheſis, that the flame contracted it ſelf according to all its dimenſions, aſſoon as ever the Engine began to ſuck, then after the ſecond or third draught of the drawn forth air, the flame about the utmoſt extremities appeared very blue, and to go back more and more from the Tallow, till at length getting to the top of the ſnuff it expired: the ſame Candle being again lighted, and ſhut up in the recipient, this worthy Gentleman tryed how long it was able to ſuſtain its light, when the air was not exhauſted, and he found it to endure much longer lighted than before. From theſe it clearly appears, that the flame ſhut up, expires not ſo much becauſe it is ſuffocated by its own proper ſmoke, as becauſe it is deſtitute of the nitrous food of the Air. For in the former Experiment the air being exhauſted, there was more ſpace for the ſmoke and fume, that the flame might not be ſtifled, and yet this dyed ſooner, the Recipient being empty, than the ſame being full of air; beſides, the flame dying became bluiſh, for as much as it is participated of more Sulphur than Nitre; and it left the Tallow, and expired at the top of the ſnuff, for that it followed its moſt neceſſary food as far as it was able, to wit, the nitrous Particles of Air. *Exper.* 78. The ſame Experiment ſucceeded alike in live Coals, *viz.* the naked fire, after the food of Nitre was drawn away, ſuddenly dyed. Here alſo it doth what the flame of a Candle doth in Mines or Caves under ground, where the nitrous air is wanting or diſpelled, at firſt it becomes more contracted and blue, and then a little after expires.

I have been more large in this Argument, becauſe there is for both the like neceſſity of drawing in of the air, after the ſame manner, for the ſuſtaining the life of the Blood, and for the continuing of flame. For the more hot Animals, if they are hindred from reſpiration dye quickly, wherefore the ſame means of killing is moſt ready and common to ſhut up the breath, which being wholly obſtructed, life periſhes as a flame. If it ſhould be objected, that thoſe choaked do dye, becauſe the ſoot or ſmoke being retained, blow up and intumifie the bloody maſs, which for that reaſon, the bulk or ſubſtance being increaſed, and made almoſt immoveable, fills the boſom of the heart, and hinders its motion: I ſay, that this is improble, becauſe if the Arteries, every where in the Limbs and about the Neck, be ſtrained hard together with Ligatures, that the blood being ſtraitned as to the compaſs of its circuit, be very much ſtopped about the *Præcordia*, (more certainly than can happen from the mere retained ſmoke) yet for that cauſe death neither preſently follows, nor any deadly Symptoms. That this happens in thoſe that are hindred from reſpiration, becauſe the vital flame of the blood is wanting of the nitrous food of the Air, rather

than overthrown by its proper ſoot or ſmoke being detained, the moſt Famous *Boyl* alſo by his Experiments hath put it out of doubt; for he hath obſerved, that hot living Creatures being put *Exper.*41. within a glaſſy Globe, and ſhut up, did far ſooner expire, the air being drawn away from them, than the ſame being left within it, though in the former caſe, there was more ſpace left for the receiving the ſmoke, leſt the retaining of it might conſtipate the blood: yet however, if the heat of the Blood ſhould ariſe from Fermentation, or the congreſſion of diſſimilar Particles, or from an ebullition, by reaſon of admitted heat, or from any other cauſe beſides accenſion, it is ſo far that that effect could be inhibited or ſuppreſſed by reaſon of the air being excluded, that on the contrary it would rather for that cauſe become more ſtrong or intenſe. For it appears, by a common obſervation, that Liquors chiefly fermentable, the more ſtrictly they are kept in the Veſſel, the more they grow hot, and the air being admitted through ſome vent-hole, they preſently ceaſe from their fury. Moreover, Mr. *Boyl*'s Experiments clearly ſhew, that the effervescencies or growing fervent, ſtirred up by the ebullition of unlike Particles, or by corroſion, alſo the boiling up of hot water in a glaſſie Sphere, are above meaſure increaſed after the air is ſucked out, *Experiment. Phyſicom.*41,42,43. That moſt ingenious Tract of the aforeſaid Author ſupplies us with many Experiments, whereby it is abundantly manifeſt, that the inteſtine motions of thoſe Particles, and almoſt of every thing, beſides fire and life, are very much heightned or made ſtrong in the ſpace emptied of air; but their act, preſently after the air is withdrawn, is extinguiſhed: hence we may conclude, the life of a living Creature to be either fire, or ſomething analogical to it. The like to theſe is yet more clearly obſerved by the diggers of Minerals, who ordinarily experiment in ſubterranean Caves, where either the Nitre is wanting, or is driven away by ſome ſtrange damp or vapour, ſo that they are in danger of being ſtifled or ſmothered, at the ſame time the flame of the Candle is diminiſhed, becomes blue, and at length expires.

The ſecond thing requiſite to ſuſtain a flame, is a conſtant ſupply of ſulphureous food, whereby it may continually be fed, which being ſubſtracted, or by reaſon of ſome incongruous mixture depraved, the flame is extinguiſhed; as is perceived in a Lamp, which for want of oyl, or water poured in its place, expires: further, as this ſulphureous food is more or leſs ſuggeſted, ſometimes more plentifully, ſometimes more ſparingly, the flame being more or leſs intenſe, is ſometimes produced clear, ſometimes ſmoaky; in the mean time, the food being conſtantly conſumed by burning, goes away partly into vaporous Effluvia's, and partly into aſhes, which are made up of ſome Particles of Earth, Salt and Sulphur: But it is much otherwiſe in Liquors expoſed to Fermentation, to which if new Particles be continually adminiſtred, and the old ones depart, the Fermentation is hindred or diſturbed.

In like manner, as in Flame, the blood of the hotter Animals (and this only in all natural things, beſides fire) requires a conſtant and copious ſulphureous food; and that being quickly worn, is for the moſt part conſumed in vaporous Effluvia's, a *Caput mortuum* being left of Earth, Salt, and ſtinking Sulphur: In the mean time from its food conſumed by burning, it diſpoſes other Particles for other uſes. That the life or flame of the blood doth continually want aliment, there is none but daily finds it in himſelf: For if that be for ſome time denied, the vigor of the blood is diminiſhed, yea, and conſuming the ſolid parts, it ſnatches into its boſom their remnants, and other humours of the Body whereby it may be fed. If the nutriment daily ſuggeſted from things taken, be too thin and watry, the fervour of the blood, like flame without food, uſes to be remitted; but if the food be very ſulphureous and ſwelling with a vinous Spirit, and plentifully taken in, the blood is preſently inflamed, and often breaks out into a Fever, as it were an open burning. In the interim, out of that food of the blood exhauſted or conſumed, as it ſeems by accenſion, hot Effluvia's full of ſoot and vapour go away, which according to a juſt account, far exceed all the other excrements of the Body; and that their nature is plainly fiery, the frequent burning of the mouth and tongue, and infecting them with blackneſs like the ſoot or ſmoke of a Chimney, witneſſes; beſides from the inflamed blood aduſt Feces, like a *Caput mortuum*, are ſent into the Bladder of the Gall, Spleen, and perhaps into other Emunctories.

Thirdly, That inkindled Flame may for ſome time continue, there is need of continual ventilation, to wit, that its ſooty Effluvia's may ſtill fly away, which elſe being detained and heaped together thereabouts, will ſuffocate the fire, becauſe by obſtructing the Pores of the inflamed Body, they hinder the eruption of the ſulphureous matter to be inflamed. Although this condition doth often interfere with the other more potent, *viz.* the neceſſity of nitrous food to be ſo drawn in from the Air, that it can ſcarce be diſtinguiſhed from it; yet we may plainly perceive, from the detained ſoot gathered together about the ſnuff, the light to be put out: for which cauſe a Lamp, whoſe wick is made of plumous Alum or other incombuſtible matter, will not (as it promiſes) endure any long time, becauſe the ſoot ſticking to the wick, hinders the acceſs of the oyl to the flame; for this reaſon blaſts of wind from the Air wiping away the ſootineſs, doth not only render the flame more clear, that is free from fume and thick vapour; but food being ſufficiently given to it, it becomes more durable.

Even as Flame, the life of the Blood requires alſo continual ventilation; to which end, beſides the greater breathing places of the Breaſt, innumerable leſſer, *viz.* the Pores of the skin gaping every where through the whole Body, do ſend forth Effluvia's departing plentifully from the boiling blood; which if it happens to be hindred, or too cloſely ſhut up, the blood will grow exceſſively hot, being as it were beſet with fume and vapour: beſides, there is need to ſhorten its circuit, that paſſing through the Lungs with a more frequent turn, it might there, as much as it can, diſpel all its ſoot or ſmoak.

When

When the Heavens are heated, the Air ſeems as it were immoveable and to ſtagnate, we are wont very much to grow hot about the *Precordia*; for that the Blood being fed with a more ſparing nitrous food doth not burn ſo clearly, but glows with a more ſuffocating and intrinſick burning: further, for that the Particles of the Air being leſs nimble, when they are inſpired and expired or breathed forth, do not ſo readily convey away the vaporous Effluvia's of the blood; hence it is, that we fan the Air, that it may be made more moveable, and carry away more quickly and plentifully the ſoot or ſmoke from our *Precordia*.

There yet remain ſome other ſmaller Conſiderations of Fire and Flame, reſpecting indeed not ſo much the Eſſence, as the production and extinction of either, which, whether and how far they may agree with the life of the Blood, we ſhall briefly inquire into.

Fire or Flame is produced two ways, *viz.* either it is kindled from another fire or flame, or begot by an inteſtine motion of ſulphureous Particles. We have largely ſhewed the Species of either, and the manner of their being made, in our Tract *of Fermentation* (only we omitted there, that the acceſſion of nitrous food was neceſſary for the ſuſtaining it) even as flame, the life alſo of the hot or warm Blood, we have obſerved to be produced by a twofold way, to wit, it is either inkindled from another life or ſoul, as in Creatures that bring forth alive; or intrinſecal Particles prediſpoſed to animation, are at length raiſed up to life with the blood by a long cheriſhing of external heat, as in oviparous or egg-laying Creatures.

If it be further demanded, when and how the vital Flame is kindled firſt in the Blood? I ſay, ſome ſmall beginnings of it are laid up from the conception it ſelf in the Genital humour, to wit, when the rudiment of the bodily Soul culled out from the Souls of the Parents, as a little ſpark ſtricken from thoſe flames, is hid in a convenient matter; which being from thence raiſed up by the Mothers heat, begins a little to glow and ſhine, and afterwards being daily dilated with the blood brought forth, and leiſurely increaſed, is equally extended with the Body, which it actuates and animates. But yet as long as the young one is included in the Egg or Womb, the vital fire, getting very little or ſcarce any aery food, doth not yet break out into open flame, but like a Brands-end covered over with aſhes, burns only ſlowly and very little, and ſpreads abroad ſcarce any heat, wherefore both the formation and increaſe of the Embryo depends very much on the Mothers heat, or the cheriſhment of ſome other analogical thing, whereof being deſtitute, it periſhes; but as ſoon as the young one is born in due time, and begins to breathe, the vital fire preſently receiving the nitrous food, largely unfolds it ſelf, and an heat or effervеſcency being raiſed up through the whole bloody maſs, it inkindles a certain flame; and becauſe the blood then firſt ruſhing into the Lungs, having there gotten an acceſſion of Air, begins to burn, the fleſh of that Bowel, at firſt reddiſh, is ſhortly changed into a whitiſh colour, like burnt aſhes, and the blood it ſelf undergoes a notable alteration; for what did flow of a dark Purple colour into the *Pneumonick* Veſſels from the right ſide of the Heart, returning from thence preſently out of the Lungs, becomes Crimſon, and as it were of a flame-colour, and ſo ſhining, paſſes through the left Ventricle of the Heart and the appending Arteries.

Indeed that in Creatures new-born, the colour of the Lungs is ſo ſuddenly changed, I think it ought to be attributed to the Blood, there at firſt more openly inkindled, and their fleſh as it were ſomewhat roaſted; although the mere inflation of the Lungs in a dead Embryo produces the like effect, becauſe the Membranes of the Lungs and the Parenchyma being diſtended and increaſed into a greater capacity, ſhake off the ſtagnating blood, and ſo draw it away into little and ſcarce to be diſcerned rivulets.

As to the Colour of the Blood, ſo variouſly changed into circulating from a dark purple to a crimſon, and from this to that, I ſay, that the immediate cauſe of this is, the admixtion of the nitrous Air with the Blood; which certainly appears, becauſe the change into a crimſon, begins in that place where the Blood chiefly gets the acceſs of the Air, *viz.* whilſt it is transferred out of the Arteries into the Pneumonick Veins; for in thoſe it appears of a dark Purple, in theſe every where florid, as the moſt Learned Doctor *Lower* hath obſerved. Further, it yet farther appears, that this alteration of the colour proceeds from the admixture of the Air, becauſe that crimſon colour follows in the ſuperficies of all blood, let out of the Veſſels by reaſon of its meeting or mingling with air: and if the flowering or top be taken away, another preſently ariſes. Beſides, the Blood being let out of a Vein, and very much ſtruck with a ſwitch or rod, it becomes crimſon through all: and in like manner the blood of living Creatures ſhines at firſt within the Pneumonick Veins, to wit, preſently after the influx of the Air by the Wind-pipe; and from thence, by reaſon of the ſame Particles of inkindled air being yet retained, it paſſes through all the Arteries ſtill florid; in the mean time, from the Nitre of the Air mingled with the ſulphureous Particles, and burning with them, the blood being greatly rarified, and in truth expanded into flame, impetuouſly ſwells up within all the paſſages of the *Pneumonick* Vein and the great Artery, ſending from it ſelf copious breaths and hot Effluvia's; but being dilated towards the ends of the Arteries, and returning towards the Heart, that it may enter more cloſely into the little mouths of the Veins, it lays aſide its turgid and burning aery Particles, and being preſently made more quiet and half extinct, and ſo both its vigour and alſo its colour being changed, it returns through the paſſages of the Veins that at length running into the Lungs, it might renew its burning. After this manner, that the inkindled blood might flame through the whole Body with a perpetual and equal flame, and ſucceſſively renew its burning in all its Particles, it ought to be carried about by a perpetual courſe from the neſt of its accenſion

into all parts, and from theſe to that. For this end the Machine or Engine of the Heart was needful, as a Pin or Cock, which being made with a double boſom, might receive in it ſelf from the whole Lungs the blood freſh inkindled, that it might preſently drive forward, whilſt burning, into every part of the whole Body, and might then receive the burnt and half extinguiſhed blood returning from the whole Body; which being imbued with new inflammable juyce, it might deliver to the Lungs to be re-inkindled.

In performing this task, although the Heart be a meer Muſcle, and exerciſed only with an animal motion, ſeems to ſerve alone for the Circulation of the Blood; yet in the mean time, it ſo much helps to moderate the accenſion of the Blood and its burning, according to the rage of the paſſions, and to direct other works and uſes of the animated body, that we have thought the vital or flamy part of the Soul to have its chief, and as it were Imperial ſeat in the Heart and Lungs, in every diſtemper or affection, as of Grief, Joy, Fear, and the like; alſo in the fits of Diſeaſes, the Heart is diſpoſed after a various manner, and hence it comes to paſs, that the blood flowing in fluctuates, and is inkindled with a divers rage; of which there will be a more opportune place of diſcourſing, when we ſhall treat of the Paſſions.

Whilſt we conſider that the burning of the Blood, and for that reaſon the vital or flamy part of the Corporeal Soul doth not appear lively or vigorous in all, nor ever after the ſame manner or meaſure; yet it exiſts according to the various conſtitutions of the blood, to wit, as it is more or leſs ſulphureous, ſpirituous, ſaltiſh, or watry, yea and according to the divers conſtitutions and conformations both of the food, with which this flame is nouriſhed, as alſo of the little ſpiracles or breathing holes, by which it is ventilated; and further, of the Heart it ſelf, whereby it is agitated and driven about here and there; the accenſion of blood varies alſo in every one, by means of ſeveral other accidents, to wit, as its flame is ſometimes great, clear and expanded, ſometimes ſmall, contracted or cloudy, ſometimes equal and in order, ſometimes unequal and often interrupted, yea and it becomes ſubject to many other mutations; alſo becauſe the Soul it ſelf having gotten a various nature or diſpoſition, it conceives divers affections and manners, whereof we ſhall ſpeak hereafter; for as much as it is not a little thing, that the diſpoſition of the whole Soul depends upon the temperament of the bloody maſs, and the degree and manner of its accenſion or inkindling.

It clearly appears, from what hath been ſaid, that Fire and Life do dye or are extinguiſhed alike many ways, to wit, there is an end of either, if the acceſs of nitrous food, or the departure of Effluvia's be hindred, or if the oily or ſulphureous aliment, requiſite to either, be conſumed, too much withdrawn, or perverted from its inflammable diſpoſition; of each whereof it is ſo clearly apparent, that there needs no farther explication.

Thus far we have ſhewn, that the Life of the Blood, or that part of the Soul growing therein, is a certain kind of Flame; let us now ſee by what means it is diſpoſed to burning, and how near it comes to the ſimilitude of a burning Candle or Lamp.

A common Lamp, whether deſigned to give heat or light, for the moſt part is wont to be made after this manner; to wit, the Oyl flowing perpetually to the wick, gives continual food to the flame; wherefore as there is but one fire-place or hearth only of light and heat, the action of either is limited only to one place, and ſo often as there is need of more places at once, or divers parts of the ſame ſpace or body to be illuminated or made warm, we place here and there divers lighted Candles or Lamps. But if an Inſtrument made with great artifice (ſuch as is truly an animated Body) with one liquor only contained in it, ſhould be made hot throughout the whole, and to be kept always warm, it ought not only to be lightly inkindled in the wick, but in the whole ſuperficies, and derived by fit Tubes or Pipes to all the parts of the Machine, then the burning liquor ought to enjoy, proportionably to all its parts, an acceſs of nitrous Air, and to lay aſide Effluvia's and other recrements, and ought alſo to have a ſupply of that conſtant expence: theſe kind of offices are not to be performed any where up and down, but only in ſome ſet places; therefore the burning liquor ought to be carried about through the whole with a perpetual turn, that all its portions might enjoy ſucceſſively all thoſe priviledges, and at once heat the whole capacity of the containing Machine, to wit, both the inward and outward receſſes. Indeed ſuch a Bannian or Bathing Engine, artificially made, might aptly repreſent the real Divine handy-work of the Circulation of Blood, and what burns in it, the Life-lamp.

But it may be objected, that the Blood ſeems not to be inflammable of its own Nature; further, ſince there is no flame or effervency of this heat to be ſeen with the eyes, it may well be doubted, whether there be ſuch a thing or no. I ſay firſt, That the Chymical Analyſis of the Blood ſhews very many particles of Sulphur and of Spirit, yea a plentiful ſtock of inflammable Oyl, which are however mixed with other more thick Elements, in a juſt proportion, to bridle their too great inkindling; to wit, that this liquor might flame out by little and little, and only through fewer parts, for the conſtituting of a benign and gentle Lamp of life: wherefore the Blood being let out of a Vein upon a burning fire, doth in ſome meaſure burn, though it is not like the Spirits of Wine, or Oyl of Turpentine, turning all into a flame; beſides, the whole maſs of Blood, as the Oyl of a Lamp, ought not to be fired; yea its burning is inſtituted for that end, that whilſt all the Particles of the Mixture being freed, ſome ſulphureous and ſpirituous are conſumed by burning, others more ſubtil being ſent in Troops, might ſerve for the neceſſary uſes of the animal Regiment; and alſo others more thick or craſs and nouriſhing, as it were boiled or roaſted, might be diſpenſed for the cheriſhing all parts; beſides, that all the dead, or worn out, and excrementitious may be ſent away by fit or convenient ſinks, and others conſtantly ſubſtituted in their places by nouriſhment.

But

But in the interim, that the vital Flame, which deſtinated to ſo many offices, we ſuppoſe to be inkindled in the Blood, (otherwiſe than the common flame, which is plainly conſpicuous) appears not at all, a probable reaſon thereof may be given; as it is moſt thin, and burns in the Heart, and its depending Veſſels as it were ſhut up in Receptacles, it doth not clearly flame out, but perhaps remains in the form of ſmoke or a vapour, or breath; yea, although the Blood ſhould openly flame out, yet it might be ſo done, that its ſhining being moſt thin, may not be perceived by our ſight, as in the clear light of the day we cannot behold a glowing red-hot Iron, nor ſhining ſpark, nor falſe fires, nor rotten wood, nor many other things ſhining by night; why then may not the vital fire, even thinner than they, quite eſcape our ſight? Although ſometimes hot living Creatures uſe to ſend forth a certain fire or flame only conſpicuous by night: For we have known in ſome endued with a hot and vaporous blood, when they have put off their inner garments at night going to bed near a fire or Candle, a very thin and ſhining flame to have ſhewn it ſelf, which hath poſſeſſed the whole inferiour region of the Body. The reaſon of which affection ſeems wholly the ſame, as when the evaporating fume of a Torch juſt put out, is again inflamed by a light inkindling, and manifeſtly argues that another flame, the root of this extrinſick one, lyes hid within the Body. For this very cauſe it is, that from the Mains of Horſes, and the Skins of Cats, or other hot Animals being ſhaken, little ſparks as it were of fire leap out, and often flames, only conſpicuous in the dark ariſe. Beſides, we here take notice in a burning Fever, cauſed by immoderate drinking of Wine or ſtrong Waters, that the Blood, as the flame of it is very much increaſed, doth grow exceſſively hot, and ſuch are wont to emit dry breaths, and ſharp Effluvia's of heat, not like thoſe that proceed from fermenting or boiling Liquor, but only inflamed. That which ſome in Fevers have imagined to have ſeen or obſerved, even burning fires and flame in the eyes, argues indeed that the flame of the blood is very ſtrong, and alſo that it penetrates the incloſure of the Brain. I knew a certain ingenious Man of a very hot Brain, who affirmed, that after a very plentiful drinking of Wine, he was able in the darkeſt night to read clearly; from hence alſo may be collected, how the accenſion of the blood, like that of burning Liquors, is to be increaſed or made ſtronger, *viz.* by an agitation of the parts, and a more plentiful affuſion of ſulphureous food.

But that in the hot blood of living Creatures, the Properties, Affections, and many other accidents of Fire or Flame are found without the manifeſt form or ſpecies of it; what if we ſhould ſay the cauſe to be, for that the vital flame of the Blood is ſubjugated, or made ſubordinate to another form, *viz.* to the corporeal Soul? Wherefore, although it retains the chief qualities and affections of common flame, yet it loſes the ſpecies of flame or fire; for in every natural mixture, the ſuperiour form exerciſes a Right and Dominion over all included Particles whatſoever, however fierce and untameable they may be in themſelves, and ſtripping them of their ſpecies, ordains and diſpoſes them to peculiar actions in that proper Concrete: when the form of fire excels, that bright burning, that it might propagate largely its ends, deſtroys and conſumes all inflammable objects. But if the form of the corporeal Soul be induced upon the fire, kindled within the blood, it burns forth without fulgor or ſhining, or deſtruction of the ſubject, and is inviſible, and as it were ſubjugated flame, is ordained for the ſuſtaining of life and its offices: but truly the Divine Providence, from the very Creation of the World, hath ſeemed to have predeſtinated Forms to natural Bodies, to wit, that they might remain as ſo many Figures or Types, according to which every Portion of matter framing the Concrete, whether animate or inanimate, might be modificated; ſo that the Maſs, according to the virtues of the hidden Seeds, being diſpoſed after this or that manner, happens to have the form of a Stone, a Plant, or Brute, or of any other kind; then the acts and affections, appropriate to ſuch a Species, follow the form it ſelf. When therefore Life or Soul is deſtinated to theſe kind of Functions of the more perfect Animals, for the performing of which, the blood, after the manner of burning Liquors, ought to be perpetually hot, and as it were inkindled; what ſhould hinder, but that the act of Life, or of that corporeal Soul (conſiſting in the motion and agglomeration or heaping together of moſt ſubtil and agil Particles) may be called a certain Burning or perpetual Fire of the bloody Maſs? Wherein although the accidents and chief qualities of common fire are implanted, yet the form of fire is obſcured, as being ſubjugated to a more noble form, *viz.* of the corporeal Soul: not much unlike water, which being congealed into Ice or Snow, lays aſide the ſpecies of water for a time, and may be applied to other uſes far diſtant from fluidity.

But truly, though we affirm, that the corporeal Soul doth ſtick in the Blood, yet we do not, that it is adequated or limited to it: becauſe whilſt the more thick portion of it, as the Roots of ſome Tree, fixed in the Earth, are ſowed in the bloody Maſs, the more noble part of the ſame Soul, as the higher branches, are expanded in the Brain and nervous Syſtem; or as we before hinted, when the vital or flamy part of the Soul is contained in the blood, the animal or lucid portion of it is contained in the Head and its Appendix: by which juſt limit the Sphere of either may be defined, neither may the vital flame impetuouſly break through the animal Region, the ſubſtance of the Brain being more cold, and alſo ſhining or bright, is oppoſed to it, as it were an icy or glaſſie Bar, whoſe inferiour frame or ſubſtance, the ſmall and ſlender as it were rivers of the Blood, for the ſake of cheriſhing heat can enter: but truly ſpirituous Particles plentifully flow from its juice or liquor, every where heaped up near the confines of the Brain, and there diſpoſed as it were to be ſtilled forth, which being immerſed in the Brain, and more exalted, affords matter, out of which the animal Spirits are procreated, to be derived through the Nerves into the various Regions of the Body.

THE

THE SECOND
Phyſical & Medical
DISCOURSE

Of Muſculary Motion.

AS there are two chief or primary Faculties of the Corporeal Soul, to wit, the Senſitive and Motive, we have aſſigned certain exteriour Powers of either of them, which are chiefly acted in the Nervous ſtock, and others interiour, the Exerciſes of which lye within the Brain, to wit, ſuch as the Imagination, Memory, Appetite, &c. What we have publickly diſcourſed of ſome time ſince both concerning internal and external Senſes, may perhaps hereafter be brought to light and made publick: in the mean time, becauſe I am oppoſed, concerning both the natural and convulſive Motion, I think it fit at preſent to publiſh what I had meditated touching the Motive power, and what Hypotheſis I had conceived of ſo hard and highly intricate a thing.

The motive Faculty of the bodily Soul is wont to be exerciſed with another kind of Action than the ſenſitive, *viz.* with a divers aſpect and tendency of animal Spirits. For that every Senſe is a certain paſſion, wherein the Soul, or ſome portion of it, being outwardly ſtruck, is forced to nod or ſhake, and a wavering of the Spirits being inwardly made to look back towards the Head; but on the contrary, every Motion is a certain Action wherein the Soul ſeems to exert it ſelf whole, or part of it ſelf, and by a declination or fluctuation of Spirits being made to bring forth a Syſtaſis, and to extend ſomething as it were its member. Further, whilſt the Soul ſo exerts it ſelf, or ſome part of it ſelf, that the works then deſigned might be performed, an heap of animal Spirits being every where diſpoſed in the motive parts, ſometimes one, ſometimes more are raiſed up by the Soul, which by that means being expanded with a certain force, and as it were exploded, they blow up the containing bodies, and ſo the ſame being increaſed as to their thickneſs, and made ſhort as to their length, are made to attract the adjoyning member, and ſtir up local motion.

1. In every motion, theſe three things ought to be conſidered: *viz.* Firſt, the original of the Action, or the firſt deſignation of the Motion to be performed, which is always in the Brain or Cerebel. Secondly, its inſtinct or tranſmiſſion of the thing begun to the motive parts, which is performed by the commerce of the Spirits lying within the Nerves. Thirdly, the Motive force it ſelf, or exertion of the Spirits implanted in the moving parts, either into a contractive or elaſtick force. From this threefold Fountain, *viz.* as the buſineſs is performed in every one of theſe in a various manner, very many kinds and differences of Motions are deduced.

1. As to the original or beginning of Motion, we ſhall take notice, that that which proceeds from the Brain, with a knowing and auſpicious appetite, may be called Spontaneous or Voluntary; but that which is wont to be excited from the Cerebel, where the Law of Nature reſides, ſuch as are Reſpiration, the Pulſe, with many others, may be called meerly Natural, or Involuntary: either of theſe is either direct, which is ſtirred up of it ſelf, or primarily from this or that beginning, as often as the appetite requires this or that thing, out of a certain proper, and as I may ſay, inteſtine deliberation, and chuſes out reſpective motions; ſo in like manner, when the ordinary offices of the natural and vital Function are performed, according to the ſolemn Rite of Nature; or the motion of either kind is reflected, to wit, which depending on a previous ſenſe more immediately, as an evident cauſe or occaſion, is preſently retorted; ſo a gentle titillation of the Skin cauſes a rubbing of it, and the more intenſe heats of the *Præcordia* ſtir up the Pulſe and Reſpiration.

2. As to the Vehicle of the Inſtinct, which we ſuppoſe to be wholly done by the Nerves, foraſmuch as it is performed by a ſingle Nerve, or by more at once, it is called either a Simple or Complicate Motion; then for that ſome Nerves help motion more or leſs than others by ſooner or later moving, this or that member is ſaid to be moved firſt, or by it ſelf, and another by conſent: yea, and that conſent is wont to be acted or done with neighbouring or more remote parts, and that with a divers reſpect: But we have in another place largely ſhewn inſtances of theſe kind of ſympathetick motions, as alſo the cauſes of each of them, and their manner of being made.

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3. There is another, and that a remarkable diſtinction of Motions, taken from the various conſtitution of the moving parts: to wit, parts endued with nervous Fibres, and in which the motive Spirits dwell; either they are Muſcles, which perform local Motions; or membranaceous bodies, the motions of which are terminated in themſelves, which therefore we call Inteſtine. As to what belongs to local motion, of which only we treat at preſent, although it be confeſſed by all, that the Brain or Cerebel, and the Nerves and Muſcles together one or more, as it were with joynt forces, do contribute to this motion; alſo, though it may be ſufficiently underſtood, that the beginning of the motion to be performed is deſigned in the Brain or Cerebel, and that its inſtinct is conveyed wholly by the Nerves; yet by what means the Muſcles perform that work, far exceeding any mechanick virtue or operation, ſeems moſt hard to be made plain.

That local Motion is performed by traction, and doth depend upon the contraction of a Muſcle, is not only a vulgar Opinion, but is alſo plain by ocular demonſtration; yet it is very much diſputed and variouſly controverted among Authors concerning the manner of Contraction and efficient Cauſe; ſome think it enough to ſay, that the Soul it ſelf, by its preſence, doth actuate the Muſcle, or contract or draw out here and there its Fibres, as it were a net ſpread forth, But indeed this is to attribute to the ſenſitive Soul a ſupernatural, and as it were Divine virtue. To wit, that the ſame, by its meer Spirit, was able to bend and force heavy and very great bodies whether it pleaſes. Further, for what end are the motive Organs framed with wonderful artifice and manifold difference, unleſs that after the manner of Machines, they might perform their operations by an orderly ſtructure, and as it were mechanical proviſion of parts? Truly it will be no hard thing to apply the exerciſes of a Muſcle and of the whole nervous Function, and to explicate them according to the Rules, Canons, and Laws of a Mechanick. Before I enter upon this, I think it not amiſs firſt to ſpeak ſomething of the make, conformation, and uſe of a Muſcle in general. The ancient Anatomiſts, almoſt all with one conſent, did divide the body of a Muſcle into Head, Belly and Tail; taking for the Head the extremity of the Muſcle connexed to the part, to which contraction is made; for the Tail, the end or portion of the Muſcle inſerted to the part to be moved; for the Belly, the part of the Muſcle coming between, which is beheld more tumid, with a bulk of fleſh; then for the performing of motion, they did ſuppoſe the Muſcle to ſwell up about the Head and Belly, and ſo to grow ſhort as to its length, and to attract nearer to it ſelf the hanging part; yet by what means, and for what cauſe the belly of the Muſcle ſwells up, none yet hath clearly unfolded.

Moreover, although the Doctrine of the Nerves hath been much deſcribed by the moſt skilful Anatomiſts of every Age, ſo that the Muſcles of the whole Body (as it is thought) have been exactly recounted, and offices aſſigned them, and monſtrous names fitted for the expreſſing them, yet the true frame of a Muſcle, not yet ſhewed by others, firſt began to be delivered lately by the moſt ingenious Doctor *Steno*. He hath found out in every Muſcle two oppoſite Tendons, into which both the Fibres go; yea, and hath taught, that the ſame Fibres wholly, which compoſe ſtrictly on one ſide, the Tendon of the knitting being more looſly joyned, do conſtitute the fleſh; yet ſo, that ſome being laid upon others, compoſe the thickneſs or profundity of the Muſcle, and ſome laid nigh to others, its breadth or latitude: he calls the former Fibres *Ordines* or Orders, but the other *Verſus* or Turnings; then the parts and compoſition of a Muſcle being after this manner laid open, he aptly reduces its Figures to Mathematical Rules, and according to Canons thence taken, ſhews the action to be unfolded: becauſe he adverting, that in a Muſcle with a ſimple right line, all the fleſhy Fibres, parallel within themſelves, and for the moſt part equal, are carried from one Tendon obliquely into another; and that thoſe Tendons are ſowed in the oppoſite ends or angles of the fleſh, whereby he moſt ingeniouſly deſcribes a Muſcle to be, *a Collection of moving Fibres, ſo framed together, that the middle fleſh conſtitute an oblique angular Parallelopipedum, but the oppoſite Tendons compoſe two quadrangular Priſms or Figures.* The Inſtrument which Painters uſe for the deſcribing many Examples of the ſame thing, fitly repreſents the figure of this delineated in a plain: becauſe the ſtyles being fixed to the oppoſite Angles, expreſs the inſertions of the Tendons and the Parallelogram it ſelf the fleſhy part of the Muſcle: for when the oppoſite Angles are diduced to a great diſtance from one another, and made ſharper, the two ſides come nearer together, and render the *Area* or middle of the Figure longer, but narrower, a Muſcle not contracted is denoted: But if the ſame Angles are brought nearer, and made more obtuſe, the two ſides go farther apart, and ſo make the middle of the Muſcle ſhorter, but alſo wider, a contracted Muſcle ſeems to be repreſented. In the mean time, in either ſite of the aforeſaid *Parallelogram* the quantity or longitude of the ſides is not changed, but only their poſition, and the largeneſs of the Angles is varied: whether it may be alſo ſo in a Muſcle, ſhall hereafter appear. In the mean time, we ſhall take notice, out of the obſervation of the moſt Learned *Steno*, that a Muſcle is either ſimple, which conſiſts of one belly and two Tendons, of which ſort there are many in the Arm and Leg, which are the movers of the fingers and toes, yea and almoſt every where in other parts of the Body; or compounded, that hath many bellies, to every one of which, two oppoſite Tendons are hung; yet ſo, as when thoſe compounded Tendons, to wit, two together, ſhall be joyned, one compound Tendon enters the middle of the fleſh, and the other embraces the middle on both parts. This is evidently diſcerned in the Maſſeter or Throat-muſcle, the Deltoid, and divers others, in all which, even as in a ſimple Muſcle, whilſt the fleſhy Fibres (to which only the motive power belongs) are contracted, the oppoſite Angles are enlarged according to the inſertions of the Tendons, and ſo the bellies being made ſhorter, and at the ſame time thicker, do ſwell up.

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In a ſimple Muſcle, according as one Tendon or both together,or either by turns, ought to be drawn; beſides, according as the part to be drawn is thin, or broad, or planted near or far off, and for ſeveral other reſpects the fleſhy belly is diverſly formed; and as the *Rhomboides* is its chiefeſt regular figure, yet that alſo is ſometimes triangular, ſometimes trapezial or quadrangular, pyramidal, ſpiral, ſemilunar, or like an Half-moon, or of ſome other irregular form. But in all theſe kind of Muſcles, the fleſhy Fibres, according to all their poſitions, whilſt they are contracted, at the ſame time intumifie or ſwell up, and are ſhortned from either end towards the middle, though in all Muſcles not always in a like manner and dimenſion; for if eitther Tendon be to be drawn at once, the contraction from either fleſhy end, is for the moſt part equal; but at the ſame time, if one only be drawn from the others that are immoveable, the contraction is made leſs, and ſometimes, *viz.* where the fleſh immediately ſticks to the bone without any notable Tendon, almoſt none.

The compounded Muſcles are diſtinguiſhed with a far greater variety; for beſides their diverſity of figures, all which would be an immenſe labour to enumerate, according as they are more or leſs compounded, or have their bellies more or fewer,with a manifold Series ſtretched out here and there, with Fibres ſometimes of the ſame, ſometimes of a divers order, they are very much differenced.

The more thin and leſs compounded Muſcle, when perhaps it is ſorted into two or three bellies, diſpoſed in the ſame being plain, hath the ſeries of fleſhy Fibres for the moſt part looking diverſly, all the exteriour Tendons embracing one end of the Muſcle, and hath the others intermediate or that come between immerſed about the other end; ſo that the ſeveral fleſhy Fibres of every Belly lye parallel between the one extreme Tendon and the other intermediate Tendon. The thicker and more compounded Muſcle, that it might perform at once quick, hard, and long motions, hath many bellies planted in divers plains, and the ſeries of fleſhy Fibres (which are all ſhort) looking many ways. The frame of them, although it be very intricate,that one can ſcarce number all the bellies,much leſs obſerve their habitudes,mutual dependences, and means of connexions among themſelves; yet they may in ſome ſort be reduced to this common Rule in moſt, to wit, in the great compounded Muſcles, ſuch as are thoſe round ones which contribute mighty ſtrength and elaſtick force to the middle of the Arms and Legs, we may take notice, in one end of two vaſt exteriour Tendons covering almoſt the whole ſuperficies of the Muſcle,which being divided preſently into many fiſſures or clefts, are ſtretched out between a broad ſhoot or claw to the other extremity of the Muſcle; then on the oppoſite ſide,about this other end, a great Tendon enters the middle of the fleſh, which alſo is cleft or divided preſently into many laps,diſtributed through the whole interiour belly of the Muſcle. And as theſe interiour lamens or laps meeting with the exteriour,and being ſtretched out almoſt to the oppoſite end, look many ways, and have their ſuperficies turning on every ſide, ſome every where are deſtinated to others oppoſite, and are committed or ſent through the intervenient ſeries of the fleſhy Fibres: ſuch a Muſcle, whoſe very many bellies being planted in divers plains,do look many ways, can by no manner or way be cleft or pulled aſunder, but that the other ſeries of fleſhy Fibres muſt be broke aſunder in the midſt. The bellies of a Muſcle, ſo very much compounded, although manifold, yet are very ſlender, ſo that the fleſhy Fibres thereof being moſt ſhort, and having their Angles always equal, but oblique,with the tendinous laps,for that cauſe make a moſt ſtrong attraction. Becauſe the numerous ſeries of fleſhy Fibres ſeem as it were ſo many diſtinct poſts or ſupporters ſet together for the moving of any weight, or rather, for that either great Tendon is preſently ſo cut into many lappets, it is like, as if a mighty draw-rope, hung for the drawing up a body, ſhould be preſently divided into many little ropes or cords, by which many men might draw at once. For whilſt the ſeveral ſeries of the fleſhy Fibres are ſhortned at once, they draw the oppoſite Angles of all the tendinous lappets together, and ſo the belly of the whole Muſcle being intumified or ſwelled up, they ſtrongly draw either end, or that which is moveable towards the middle.

On every Muſcle, both ſimple and compound, there is ſtretched on every ſide a membranaceous covering; beſides, other little Fibres traverſe, to wit, membranaceous, are woven between the direct moving fleſhy Fibres of every one, which clothe each of them, and keep or faſten them together, yea (as it ſeems probable (they both communicate to all the fleſhy Fibres the ſame inſtinct of obeying the motion, and alſo carry to the Tendons, the troops of the inflowing Spirits,received from the Nerve.

The Arteries and Veins, inſerted in the middle of every Muſcle, ſend forth little branches on all ſides, obliquely cutting the moving Fibres, from which leſſer branches diſperſed between the *Interſtitia* of the fleſh, water them all with a flux or reflux of the blood. But the Nerve entring the fleſhy belly of every one, diſtributes ſome ſmaller circles only in the neighbouring parts, as it were bearing only the Symbol or mark of the commanded action,commands the execution of it to the Guard or inferiour Company of the fleſhy Fibres and membranaceous Fibrils.

I had deſigned Figures, almoſt of every kind of Muſcles, to be engraved according to the natural appearances: but the Printer making haſte, I had not the opportunity to diſſect an humane Body, having only taken ſome few Muſcles from the Leg of an Ox, we have cauſed them to be delineated to the life, which are to be ſeen at the end, although the famous *Steno* hath already accurately performed this task. Which Figures, if any one think too much bending to Mathematical Rules, he may with an eaſie labour behold the ſame Conformation of a Muſcle,as he hath deſcribed it in the fleſh it ſelf. For if a ſimple regular Muſcle be cut out of any Animal,and ſo placed,that the Tendons here and there be held on the ſides, the fleſhy Fibres between them intercepted in oblique and equal Angles, be preſſed upon an Horizontal

tal plain, the fleſh will be exactly like a Rhomboides or an oblique angular Parallelopipedum. Then if the ſite of the ſame Muſcle being changed, and its Tendons placed above and below, you ſhall cut long ways the inferior Tendon, and pull the parts one from another, and divide by tearing the whole Muſcle into two parts, you ſhall preſently ſee a moſt elegant ſpectacle, all the fleſhy Fibres diſpoſed in one ſeries, yea and parallel between themſelves, and of the ſame longitude, to proceed from one Tendon into another, and to make both Angles always oblique and equal; although we cannot cleave after this manner the compounded Muſcles, whoſe manifold bellies have a diverſe plain, yet it will eaſily appear, to one curiouſly cutting them, either raw or boiled, two Tendons to be fitted to each Parallelogram of the fleſh.

As to what reſpects the action of a Muſcle, we plainly ſaw in diſſected living Creatures, (which only ſhew this) that it is contracted, yet not ſo as the old Opinion declared, to wit, that the Fibres being contracted from the end towards the beginning, one extremity of the Muſcle was carried towards the other; but the fleſhy Fibres only and their ends are ſeen to be contracted towards the middle, the Tendons being ſtill unchanged and altered neither as to their longitude or thickneſs: which thing alſo the moſt Learned *Steno* did firſt of all obſerve long ſince. This is clearly perceived in the Diaphragma and the Muſcles dedicated for Reſpiration, which are moved with a conſtant change: for as often as the Muſcle is contracted, you may behold all the fleſhy Fibres, in either extremity, to be pulled together at once, and as if they would enter on either ſide one another to be carried nearer, and ſo at once to become ſhorter and thicker, then from that conſtriction to return looſe to their wonted longitude and ſlenderneſs. Whilſt you behold this to be ſo done, you will eaſily think, that ſomething, to wit, ſpirit or ſubtil matter doth flow from the Tendons into the fleſh or fleſhy Fibres, which entring them on either ſide, blows them up, and at the ſame time draws them together nearer within themſelves, that preſently all the Fibres are made ſhorter and intumified; then when that matter recedes from the fleſh or fleſhy Fibres into the Tendons, the Fibres being emptied and looſned from their corrugation or wrinkling, are reſtored to their former longitude, and ſo by turns: whether this in truth be ſo done or no, ſhall be diſcourſed anon.

In the mean time, that we may proceed to other appearances of Muſcular Motion, if that the Membrane of the Muſcle being drawn away, you ſhall ſeparate ſome fleſhy Fibres from others by cutting the little fibrils, whereby they are joyned, and looſen them quite, you will ſee them ſo ſingular and free, to be wrinkled or drawn together in every motion like the others compacted together.

Further, I advertiſe you, that theſe Fibres ſo looſned and freed, ſome cut off in one end, and ſeparated from the Tendon, did yet contract themſelves to the motion of the Muſcle, together with the other Fibres, about the other whole end, without that cut off in the mean time growing flaggy or looſe. After this I divided with a pair of Sciſſers, a certain fleſhy portion of the thinner Muſcle, in three or four pieces tranſverſe, the bigneſs of an inch: which being done, the portions cut off in either end, only entred into, for a ſhort ſpace, ſome light and inordinate corrugations, and preſently became immoveable. The other extreme portions of the Muſcle ſo cut, ſticking to the Tendons, continued to be much more lively and longer contracted, but irregularly and convulſively, to wit, with a certain intortion of the Fibres. Truly, in the Fibres ſo cut off, ſome ſmall footſteps of contraction did remain for a little while, partly by reaſon of the Inſtinct of Motion delivered through the membranaceous fibrils, by which they did yet cohere with the whole fleſh, and partly becauſe the animal Spirits, implanted in the fleſhy Fibres, now divided from the reſt, and left without influence, did exert or put forth their utmoſt contractive endeavours after the uſual manner. For this reaſon ſometimes in the Heart taken out, and in a piece of it cut off with a Sword, as alſo in other Muſcles, after the Nerves and ſanguiferous Veſſels are cut off, a contraction and relaxation continue for ſome time. The other Fibres cut off only by reaſon of the acceſs and receſs of the Spirits from the Tendons were able ſtill in ſome meaſure to be contracted and relaxed.

When in the Diaphragma I had freed many ſingular Fibres from the knittings of others, I tryed what Ligatures put in ſeveral places of them might effect. Some of them then being bound about the middle, were contracted even as the whole fibres, but with ſome little ſwelling about the Ligature. When I had bound others about the ends, where they cohere to the Tendons, now one, then another, the motion was cheifly and almoſt only continued about the free end. Further, in the fibres bound at both ends at once, the contraction wholly ceaſed.

Contraction and Relaxation are not only ſeen, and indeed probable, in the Heart, but in the Diaphragma and other Muſcles appointed for Reſpiration, which uſe to be performed in all, acting viciſſively, according to the Inſtincts of Nature, and for the moſt part equally (though there are not the like intervals of motions in all) yea, and the Muſcles ſerving to the voluntary function, enter oftentimes into ſpontaneous Contractions, unleſs they be hindred by their Antagoniſts, as it appears, for that the Spaſm or Cramp of one Muſcle comes upon the Palſie of another. Contraction and Relaxation are iterated more ſwiftly in the Heart, than in the Muſcles of Reſpiration, and ſo perhaps in theſe, than in ſeveral others. In thoſe ready to dye, the fleſhy Pannicle every where trembling, clearly ſhews their changes by innumerable beatings or leapings.

As to what reſpects the Humors, whereby all the fibres of a Muſcle, *viz.* the fleſhy, tendinous, and membranaceous, and what lies between them, ſeem to be watered, filled, or blown up, we ought to take notice of them, at leaſt two of them, (to wit, the bloody and nervous liquor) if not more. And in the firſt

place it is clearly manifeſt to the ſenſe, that the blood doth waſh all the fleſhy and membranaceous fibres which are interwoven with theſe: becauſe, if the Spirit of Wine, tinctured with Ink, be put into an Artery belonging to any Muſcle, the Vein in the mean time being tyed cloſe, the ſuperficies of all the fleſhy fibres and tranſverſe fibrils are dyed with blackneſs, the Tendons being then ſcarcely at all changed in their colour; it appears from hence, that the blood doth every where outwardly water all the fleſh or fleſhy Fibres, and only thoſe. We have not yet found by any certain mark, whether the blood enters more deeply the fleſhy fibres, or inſtils into them the ſubtil liquor falling from them, although this laſt ſeems moſt probable; but indeed we affirm, that all the fibres, *viz.* the fleſhy, tendinous, and membranaceous, are perpetually and plentifully actuated by the implanted and inflowing animal Spirits, and conſtantly imbued with the nervous liquor, which is the Vehicle of the Spirits. But how far, or how much the aforeſaid humors conduce to the exerciſe of the animal Faculties, doth not eaſily appear; but becauſe the animal Spirits cannot conſiſt without the nervous liquor, and depend very much upon its diſpoſition, we may conclude, that it doth ſerve ſomething to the actuating the motive power; for that reaſon alſo, that the continual afflux of the blood is nevertheleſs neceſſary, an Experiment cited by the Ingenious *Steno*, and proved of late by others, plainly confirms. He hath obſerved, that in a living Dog, the deſcending great Artery being tyed without any previous cutting off, the voluntary motion of all the poſterior parts have ceaſed, as often as he tyed the ſtring, and as often returned again as he looſned the knot.

Theſe are the chief Phænomena to be obſerved concerning the frame and action of a Muſcle in the diſſection of Animals, both of ſuch as were living, as alſo of the dead and dying. From which, however placed together and compared among themſelves, how difficult a thing it is to conſtitute the Ætiology of the animal motive faculty, appears even from hence, that the moſt Ingenious *Steno*, after he had very accurately delivered the Elements of his Myology, by himſelf firſt invented, nevertheleſs he wholly avoided that Hypotheſis which might be founded out of them; for that he yet doubted, whether the explication of a Muſcle by a Rectangle were convenient to the Nature in all, wherefore when many run to the manner of muſculary Contraction, by the repletion of the fibres, and others from their inanition, and ſome to both, he ingenuouſly profeſſes, that the true cauſes of this thing do not clearly appear to him.

And as to this abſtruſe matter, although I do not believe that I am able to bring to light, or ſhew any thing more certainly than others; yet as in mechanical things, when any one would obſerve the motions of a Clock or Engine, he takes the Machine it ſelf to pieces to conſider the ſingular artifice, and doth not doubt but he will learn the cauſes and properties of the Phænomenon, if not all, at leaſt the chief: In like manner, when it is brought before your eyes to behold and conſider the ſtructure and parts of a Muſcle, the conformations of the moving fibres, their geſts and alterations whilſt they are in motion, why is it that we ſhould deſpair to extricate the means or reaſons of the motive function, either by truths or by what is next to truth? Wherefore I think it may be lawful for me here to bring before you our conceptions and notions concerning this thing, indeed notraſhly taken, or to comply with our former Hypotheſis, or to oppoſe any other; which if they ſhall not ſatisfie all, may at leaſt excite others to find out better.

But we ſhall here repeat what we have mentioned before, *viz.* that the power or virtue by which a Muſcle is moved, proceeds from the Brain, is conveyed through the Nerves, and is performed by the fleſhy fibres contracted, and by that means abbreviated. This latter is proved by ocular demonſtration, yea it appears by it, that the motive force doth depend alſo upon thoſe former, and is ſo transferred by a long paſſage, that the influence of the Spirits being ſuppreſſed in their beginning, or intercepted in the way, for that reaſon the execriſe of the deſigned motion may be hindred. Further we notifie, that the motive force is far greater in the Muſcle, or in the end, than in the beginning or middle: becauſe the Brain and depending Nerves are made of a tender and fragil ſubſtance, and can pull or draw nothing ſtrongly; but the Muſcle putting forth ſtrongly its contractive force, ſeems almoſt to be equal to the ſtrength of a Poſt or Crow, or of a Pully or Windlace. Sometimes the local motion is a compound Action to be performed of many Organs, which conſiſt in divers places, and as its virtue is far more ſtrong in the end than in the beginning or way, we will inquire by what means, as it were mechanical, the motive force may be ſo augmented or multiplied in its progreſs, then what is brought to the motion from ſeveral Organs.

As to the firſt, in Artificial things, when for the facilitating of motion, and the increaſing the moving force, many Inſtruments are invented, all of them, or at leaſt the chief, may be reduced to theſe two Heads, *viz.* firſt, either the ſame force or impreſſion may be continued, without the addition of any new force, from one term or end to the other, or from the firſt mover to the thing moved, which notwithſtanding may be much increaſed in the way, as the Centers of Gravity are farther off or multiplied; for the farther the motion is begun from the firſt Center of Gravity, the ſtronger it proceeds, as is beheld in a Crow or Leaver, and in other things reducible to a Leaver. Then if other things be diſpoſed beyond the firſt Center of Gravity ſucceſſively before the end of the motion, as in a circular Wheel, the ſame motive force is wont to be increaſed very much. But to this there is required, that the inſtruments of motion be ſufficiently ſtrong and tenacious in their whole tract; for otherwiſe the motive force being increaſed, the ſame breaking falls down before the deſigned action be performed. Secondly, there is another way of multiplying the motive force to a great degree, and alſo at a great diſtance, which is performed with the addition of new forces or of freſh ſupplies, to wit, when the elaſtick Particles, or thoſe making the force, being diſpoſed and ſhut up in private places, as it were little Cells, afterwards, as occaſion ſerves,

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are ſent forth by a light contact or blaſt of a remote Agent, into the liberty of motion, which they readily perform. By this means, Air compacted and ſhut up, when it is permitted to get out, impetuouſly forcing a Bullet or other ſubject, ſends or drives it out a great way. It is ſufficiently known what mighty and often horrid forces Gun-powder yields about the end of the Exploſion, when in the beginning or firſt inkindling, the force being tranſmitted through the fiery fume, as yet weak, might be reſtrained by a light impreſſion of the hand. There are alſo other exploſive little bodies of a various kind, which being hid in convenient Boxes or Cells, when they are raiſed up into motion by an inkindling, or irritament, or provocative, do often exert an incredible force. It behoves us then to inquire from which of theſe ways it comes to paſs, that the motive force doth in the Muſcles ſo far exceed the force tranſmitted from the Brain through the Nerves, or whether the action of a Muſculary Motion be merely contractive, or rather elaſtick, or in ſome meaſure exploſive?

Concerning theſe things it manifeſtly appears, that the Muſcles do draw, to wit, being abbreviated, do bring the Tendon with the hanging part towards it ſelf. Further, for as much as there is need for the officers of traction to be ſometimes more ſtrongly, ſometimes more weakly performed by them, ſo to have the Centers of Gravity now higher, now farther off planted from the beginning of the motion; hence the Muſcles which extend or bend the Thigh, eſpecially the *Pſoæ* and *Glutiæ* (great Muſcles beginning in the Breaſt, and reaching into the Thigh) do hide their fleſhy moving fibres deeply within the Trunk of the Body: but thoſe which turn about the Thigh are conſtituted either near the hole or the riſing of the Bone of the Thigh, or ſomewhere thereabout; in like manner it is obſerved in all the reſt of the members, that the belly of the Muſcle gets a more remote or nearer ſite from the article or hinge of motion, as it deſigned for performing either a ſtronger or weaker motion; But truly this doth not hold as to the other moving parts, to wit, the Brain and Nerves, which cooperate with the Muſcles in the motive Act; becauſe, although the motive force is carried by a long paſſage through all theſe Organs, yet it ſeems impoſſible, that a contraction ſo ſtrongly performed by a Muſcle, ſhould be begun by the tender and immoveable Brain, and continued through the ſmall and fragil Nerves, but that it muſt neceſſarily be ſuppoſed ſome motive Particles are hid in the Muſcle, which, as occaſion is given, are ſtirred up according to the Inſtinct, delivered by the Nerves from the Brain, into motion, as it were with a certain exploſion. But what theſe Particles may be, by what means they are inſtigated into motion, and how they induce the contraction of a Muſcle, ſeems moſt difficult to be unfolded.

Truly it may be lawfully concluded from the effect, that elaſtick Particles, and fit to move themſelves, are contained in the Muſcles, and hid every where within the fibres, becauſe the Anatomy of living Creatures diſcovers often a motion in a ſeparated Muſcle, yea in its fibres divided one from another. The Hearts of ſome Animals beat a long while being pulled out of the Body, the Muſcles cut off, ſometimes perform the motions of contraction. In great labouring Beaſts ſlain or dying, although the Heart and the Brain be taken out, the fleſhy Pannicle perfoms for ſome time very many turns of contractions and relaxations. From theſe it is manifeſtly clear, that there are among the Particles of the Muſcles agil and ſelf forcers, or carried by their own force heaped together, which, although the animal œconomy be very much diſturbed or overthrown, do enter into motion of their own accord, yet in a tranquil eſtate they perform no actions, unleſs commanded by the Brain or Cerebel, and delivered by the Nerves.

Whilſt a Muſcle is contracted, the cutting up of a live Creature ſhews only the fleſhy fibres to run into motion by themſelves, to wit, being made more tumid, ſharper, and ſhorter at the ſame time, to amplifie or enlarge the belly of the Muſcle, and in the interim, the Tendons, as if immoveable of themſelves, to wit, not altered either as to their thickneſs or length, only pulled as it were by the fleſhy fibres, to be moved, and to draw with them the moved part; whence it ſeems to be manifeſt, that the animal Spirits or elaſtick Particles, whichſoever they are, whilſt they perform the Muſculary Motion, are only or chiefly agitated among the fleſhy fibres. Further, hence any one may ſtrongly think, that ſuch Particles are not at all contained, or are wholly idle in the tendinous fibres; for as we have noted, that the Tendon is not changed in the act, we may lawfully ſuſpect, that it is only inſtead of a Crook, by which means the fleſhy fibres being contracted, may draw the member to be moved at a diſtance from them towards themſelves.

But indeed it ſufficiently appears by evident ſigns, that the animal Spirits or elaſtick Particles do lodge within the Tendinous fibres, and truly much more plentifully than in the fleſhy: Firſt, the ſenſe ſhews this, to wit, the touch, which is much ſharper and far more ſenſible in the Tendon than in the fleſh: yea any irritation or breach of the unity happening in that part, brings not only a moſt troubleſom ſenſe, to wit, a very cruel pain, but beſides, is wont to excite in the neighbouring fleſh a Tumor or Swelling, and frequently moſt grievous Convulſions; whence we neceſſarily conclude, that the animal Spirits do inhabit the tendinous fibres in great abundance: but what they do there, and by what means they ſerve to the motive function, we will next inquire.

As often as the motion of a living Muſcle was beheld by me, I conſidered and weighed in my mind by what means all the fleſhy fibres were contracted and releaſed by turns, I could conceive or collect no other thing than that in every contraction, the Spirits or certain elaſtick Particles did ruſh into the fleſhy fibres from either Tendon, and did intumifie and force them nearer towards themſelves or together; then the ſame Particles preſently coming back from the fleſh into the Tendons, the relaxation of the Muſcles happened. In a bare or naked Muſcle, when I had ſeparated every fleſhy fibre or a company of them apart from

from the reſt in the whole paſſage by help of a Miſcroſcope, I moſt plainly perceive the Tumor, begun at either end of the fleſh, to be carried towards the middle, as it were by the Spirits, entred here and there at once. Further (which I mentioned before) each fibre being tyed about the middle, being as it were as yet free and compacted with the others, was contracted or drawn together; but a Ligature being put to both ends, is remained flaggy conſtantly above or beyond the bound place. But that I might no longer doubt concerning this, I applied two Ligatures, at equal diſtances from the middle and the ends, about the ſame bundle of fleſhy fibres, which being done, a contraction and ſwelling up ariſing preſently from either fleſhy extreme to the places bound, went no farther; the middle part between in the mean time being unmoved, remained flaccid; whence it may be well concluded, that in every muſcular contraction the animal Spirits or elaſtick Particles do leap out from the tendinous fibres into the fleſhy, and viciſſively in the relaxation, recede or run back from theſe into thoſe.

However this being proved and granted, there yet remain very many difficulties concerning Muſcular Motion; for firſt, it may be asked how the animal Spirits, which enter ſilently, or without any incitation, or Tumor, the tendinous fibres do ſo blow up the fleſhy fibres, that they are able to force them altogether into ſhorter ſpaces.

For the producing this effect, plenty of Spirits leaping from the tendinous fibres, do not ſeem alone ſufficient; but beſides, we may ſuppoſe ſome other kind of Particles, implanted in the fleſhy fibres, meeting with the others flowing from the Tendons, do forthwith ſtrive, whence a mutual rarefaction, and turgeſcency or ſwelling up of them, or an inflation or ſudden blowing up of the containing bodies, together with an abbreviation or ſhortning of them, doth ariſe; not much unlike, as when the Corpuſcles or little bodies of fire entring into a piece of leather, or any thing, and forcing variouſly here and there its implanted Particles (whereby they are preſently inſnared) make it ſo to be ſtuffed and wrinkled; in like manner alſo the animal Spirits, although they paſs through the Tendons, where they are ſolitary or by themſelves, without moving them (as the Effluvia's of heat in Metals or more dry bodies) yet being dilated in the fleſh, for that there joyning with elaſtick Particles of another kind, they are expanded or ſtretched out, they cauſe the ſudden inflations and corrugations of the containing fibres. But we have elſewhere ſhewn, that ſuch Particles divers and wholly heterogene to the nature of the Spirits, may be copiouſly and eaſily carried to the Muſcles. For indeed it is plain by ocular demonſtration, that the blood doth every where waſh and water outwardly all the fleſhy fibres, which beſides, it is thought not only to nouriſh, but alſo to be buſied about the offices of the animal Function: and what can be leſs ſuſpected, than that it doth inſtil into their Pipes a certain ſubtil liquor, whoſe Particles being agitated, and alſo rarified by the Spirits flowing therein, ſtuff up the fibres, (as we but now hinted) and compel them intumified, by reaſon of the aſſault on either ſide made, into ſhorter ſpaces.

But that the fleſhy belly of the Muſcle, whilſt it is contracted, doth ſwell up, is not at all to be doubted, becauſe this is evidently beheld by the ſight and touch in the diſſection of living Creatures: to wit, all the fleſhy fibres being wrinkled together, are made more tumid and ſharper, and ſo ſhorten the Muſcle, and make it alſo thicker and broader: For the more certain belief of this, when I had bound ſome of the fleſhy fibres, ſeparated from the knitting of the reſt, and had left others near them looſe, there appeared a notable difference between thoſe flaccid or not ſwelled, and theſe intumified or ſwelled up in every contraction of the Muſcle.

But if it be demanded, of what nature, to wit, whether ſpirituous ſaline, as may be believed, or of any other diſpoſition, the animal Spirits, derived from the Brain into the Muſcles, may be; and then whether the other Latex, immediately carried to them from the blood, is ſulphureous or nitrous. Concerning theſe, becauſe it appears not to the ſenſe, we ſhall pronounce nothing raſhly or poſitively. But even as in other natural things, the active Particles of a various kind, which being unlike among themſelves, are found apt mutually to grow hot, or to be ſtruck off from one another, otherwiſe to be rarified or expanded; and as the inteſtine motions of Bodies, and eſpecially the elaſtick, ſuch as are the contractions of the Muſcles, can only proceed from the congreſſions of ſuch like, certainly it may be lawful to preſume, that theſe do wholly depend upon ſuch a cauſe.

Therefore as to the Muſcular Motion in general, we ſhall conclude after this manner, with a ſufficiently probable conjecture, *viz.* that the animal Spirits being brought from the Head by the paſſage of the Nerves to every Muſcle, (and as it is very likely) received from the membranaceous fibrils, are carried by their paſſage into the tendnious fibres, and there they are plentifully laid up as in fit Store-houſes; which Spirits, as they are naturally nimble and elaſtick, where ever they may, and are permitted, expanding themſelves, leap into the fleſhy fibres; then the force being finiſhed, preſently ſinking down, they ſlide back into the Tendons, and ſo viciſſively. But whilſt the ſame animal Spirits, at the inſtinct given for the performing of motion, do leap out of the tendinous fibres into the fleſhy, they meet there with active Particles of another nature, ſupplied from the blood, and preſently they grow mutually hot; ſo that by the ſtrife and agitation of both, the fleſhy fibres, for that they are lax and porous, are ſtuffed up and driven into wrinklings, from all which being at once wrinkled or ſhrivell'd up, the contraction of the whole Muſcle proceeds; the contraction being finiſhed, the ſincere or clear Spirits, which reſide or are aſſwaged, go back for the moſt part into the tendinous fibres, the other Particles being left within the fleſh; the loſs or waſting of theſe the blood ſupplies, as the Nerves do thoſe. By what inſtinct the muſcular contraction begins and ends, ſhall be inquired into preſently.

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That the animal Spirits, flowing from the tendinous Fibres, may enter equally all the fleſhy, there are two Tendons in every ſimple Muſcle, which are ſo conſtituted, according to oppoſite Angles, that the Spirits running to them from a twofold ſtarting place or bound, might preſently fill the whole belly of the Muſcle, and that motion being finiſhed, might immediately ſwiftly retire. If the contraction ought to be performed indifferently towards the middle of the fleſh, the Tendons for the moſt part are equal; but if the motion inclines more towards one region of the fleſh, one Tendon (to wit, which may ſupply a greater company of Spirits) exceeds the other in magnitude. If the Muſcle, whereby it may be the ſtronger, is big and endued with an ample bulk or ſubſtance, it is divided as it were into many Lobes or Bellies, and two Tendons are ordained to each of them; to wit, to the end that the animal Spirits might be carried through ſhort paſſages from the Tendons into the fleſhy fibres, and might leap back again: becauſe the compounded Muſcle doth not always contain more ſeries of moving fibres, that it might perform many and divers motions, but that it might make the ſame motion often with the greater ſtrength. For, as we hinted before, as a ſimple Muſcle was as a ſingle leaver or bar, the compound ſeems as if it were many leavers or bars ſerving for the removing the ſame body conjunctly.

Further, hence we may obſerve in ſome Muſcles, which are ſimple and regular, that all the fleſhy fibres are equal, and ſo all the tendinous of one extreme being put together, are equal to all of the other end being put together; yet they ſingle, where they are ſhorter in one Tendon, are longer in the other, and ſo diſpoſed, that the tendinous fibres on either part, the top and bottom, have their exceſſes inverſe, and at once equal; to wit, that here a long is laid upon a ſhort, or the longeſt upon the ſhorteſt, and there quite contrary, the ſhorteſt upon the longeſt, to the end, that the motion might be ſo made every where in this or that ſide of the Muſcle, or at the end more ſtrong, more plentiful Spirits flow together into thoſe parts from the longer tendinous fibres, and on the contrary: wherefore in ſome Muſcles leſs neceſſary, where the part of the fleſh growing to the bone, either becomes immoveable, or only ſerves for the filling up of empty ſpaces, one Tendon is ſhorter or leſſer, and oftentimes degenerates into a bony or cartilaginous hardneſs. Further it is obſerved, as to other ſtrong and greatly moving Muſcles, that their Tendons are not ſo diſpoſed, as if they were only ſtays, props, handles, or hanging crooks of the fleſhy fibres; for ſo they are only conſtituted in their extreme ends; yet the tendinous fibres, that they may be made more apt promptuaries of the animal Spirits, being ſtretched out almoſt into all parts of the Muſcle, receive every where both ends of the fleſhy; which indeed yet more manifeſtly appears in the compound Muſcles, for that one Tendon being compounded, embraces the extreme fleſh, and the other enters into the middle of the fleſh, as hath been already ſhewn.

But truly they animal Spirits, whilſt they leap out of the tendinous into the fleſhy fibres, are not ſufficient of themſelves for the wrinkling of them, but require another elaſtick Copula from the blood; this may be argued from many reaſons. Firſt, it ſeems to appear from this, that the ſame Spirits being ſolitary or by themſelves, though moſt thickly planted within the Tendons, ſtir up no Tumor or Contraction whilſt they are moved in them; wherefore being dilated within the fleſhy fibres in a leſſer quantity, and having got a larger ſpace, they would be ſtretched out, unleſs they met or ſtrove with other Particles, much leſs would they obtain a contractive force. Beſides, when any wound or grievous trouble happens to a Tendon, the belly of the Muſcle or fleſhy part is chiefly troubled with a Tumor or Spaſm; for the Spirits being irritated, not ſo much within themſelves, but where they are violently driven among heterogene Particles, ſtir up the greateſt tumults and inordinations. But further, when the fleſhy fibres are watered with the ſanguineous humor beyond other parts, and more than may ſuffice for their nouriſhment, for what other uſe ſhould it be aſſigned, unleſs that it may contribute to the motive function? Eſpecially we take notice in lean Bodies, which are more ſparingly nouriſhed, that the Muſcles being fuſed or drenched with more plentiful blood, do perform the ſtrongeſt endeavours of motions: moreover, it doth not appear by what way beſides, the expence of the Spirits in a Muſcle, conſumed with continual hard motions or labours, ſhould be made up or renewed, unleſs, beſides the ſmall ſupplements by the Nerves, others ſufficiently plentiful ſhould be ſupplied from the bloody maſs. Add to theſe, that members deſtitute of the wonted afflux of blood, eaſily fall into weakneſs or a Palſie; and that from the obſervation of Doctor *Steno*, in a live Dog the trunk of the deſcending Artery being tyed, all the lower or poſterior members were ſuddenly deprived of motion. And though it doth not yet appear plainly to me, whether the excluſion of the blood from the ſpinal Marrow, or from the Muſcles themſelves, or from both together, be the cauſe; yet however it comes almoſt to the ſame thing, for as much as the animal Spirits being procreated within the Head, and ſtretched out by the medullary and nervous Appendices into every member, without the conſourſe of the blood, they ſhould not be able to perform the loco-motive power.

Having thus far explained by what means a Muſcle being contracted in the fleſhy part, as to all the fibres at once, performs the motive function; we ſhall next inquire, what is the reaſon of the Inſtinct whereby every motion, both regular and irregular, is wont to be obeyed or is performed. Concerning this in general, it firſt appears, that the motions of every regular motion, yea and the impulſes of ſome irregular motions being conceived within the Brain or Cerebel, are tranſmitted from thence by the Nerves to every Muſcle. This (as we have elſewhere ſhewn) is moſt evidently declared by the effects and conſequences: yet here great difficulties remain, to wit, how by the ſame paſſages freſh forces of animal Spirits are conveyed form the Head to every Muſcle, and at the ſame time the old ones exerciſing the Empire of the Soul; beſides, with what difference and divers carriage of the inflowing Spirits, the Nerves perform either of theſe tasks, or both theſe offices.

Of

Of theſe, as I conjecture, it ſeems that the animal Spirits, which flowing continually from the Head to refreſh the forces of the implanted Spirits, are carried to the Muſcle by the Nerves, do move to it quietly and eaſily, and being there preſently received by the membranaceous Fibres, they go apart into the Tendons: which kind of relief, although it ſhould be but little in bulk, yet becauſe it is carried night and day by a conſtant courſe, it eaſily ariſes to a ſufficient proviſion for the continual filling up of the Tendons. But that we ſuppoſe, the Spirits ſo brought perpetually to the Muſcle to be transferred by the membranaceous Fibres, and not by the fleſhy, to the Tendons, the reaſon is, becauſe if they ſhould firſt enter into theſe, ſtraight runing into an elaſtick Copula, they would ſtir up the Muſcle into continual motions: moreover, for that in the Heart and Muſcles of Reſpiration the fleſhy Fibres are exerciſed with a perpetual motion, they wait not for the paſſage of freſh Spirits to the Tendons.

But as to what reſpects the Inſtincts delivered through the Nerves from the Head for the performing, or ſtaying, or any ways, altering of the muſculary motion, of theſe we ought firſt to conſider, that the moving animal Spirits, whoſe companies or throngs conſtitute the Hypoſtaſis of the bodily Soul, have theſe two properties as it were implanted in their nature; to wit, that whilſt they are lively, numerous, and free, they exert or expand themſelves, then that force being finiſhed, they being a little diminiſhed, retire themſelves and grow quiet; but afterwards being refreſhed, they leap out again, and ſo viciſſively. Waking and ſléeping, and the alterations of work and idleneſs or reſt, inbred in all living Creatures, ſufficiently declare this. Wherefore to the impulſe or inſtincts of ſome Muſcles, (which are wont to be perpetually contracted and releaſed) ſcarce any thing more is required, but that their Tendons may be ſupplied by the Nerves with a conſtant influx of animal Spirits; but the Spirits themſelves, becauſe they are numerous and expeditious of their own nature, do willingly leap out into the moving Fibres, then the charge being performed, after a ſmall loſs or expence, they immediatly withdraw, and being again preſently recruited, they are again expanded, and ſo viciſſively. Further, their actions (which chiefly are Pulſe and Breathing) are variouſly changed according to the degrees of heat or of the affections; for as much as the Spirits being brought by the Nerves, are ſent from the Cerebel, ſometimes more remiſly, ſometimes more plentifully, or more nimbly.

Further, in ſome other Muſcles ſubject to the Empire of the Appetite, as the animal Spirits naturally affect turns of expanſion and receſs, there is only need of a ſign to be given, either for the performing or ſtopping of the commanded motion; either of which, the inflowing Spirits by their various knocking againſt the Muſcle, eaſily perform, in ordering the implanted Spirits into various aſpects or tendencies. When the Muſcle is contracted, the implanted Spirits, whilſt they are looſned from either end towards the middle, look and tend with a changed front from the middle towards either end. And ſo, whilſt the inflowing Spirits carry the Symbol of performing Contraction, they being incited by heaps within the Nerve, more fully blow up its end, inſerted to the Muſcle, (where they are more thickly crowded together) and ſo cauſe it there to be contracted and abbreviated; whereby it comes to paſs, that the ſame inflowing Spirits, about to enter into Muſcle, are at that time ſtopped by a mere heap, or rather are called back towards the intumified Nerve; wherefore by and by the whole ſeries of the implanted Spirits (hence their inclination being changed) alſo looks that way, and ſo the inhabitants of the Tendons, leaping out from their little Cells into the fleſhy Fibres, cauſe motive contraction: then the motion is broken off or ceaſes as ſoon as the Spirits being before called back towards the Nerve, do tend again into the Muſcle, and ſo the front of the Army being again changed, bands of the implanted Spirits are preſently compelled into the Tendons. That the thing is in a manner thus, I am perſwaded, not out of a mere agreeableneſs or concinnity of our Hypotheſis, but from Anatomical obſervation, Becauſe once diſſecting a Whelp alive, when by chance I beheld ſome Muſcles of the hinder part of the Head and Neck divided and ſeparated at the ſame inſtant, wherein the fleſhy Fibres, as alſo the Nerves inſerted into them, were ſeen at once to be contracted, and being intumified, to be abbreviated.

For the promoting the receſs of the Spirits out of the fleſhy Fibres into the Tendons, whilſt the Muſcle is contracted, the membranaceous Fibrils, which every where cut croſs wiſe the fleſhy, and thickly ſtick between, ſeem to help. The texture of theſe never to be enough admired, is better perceived in a Muſcle endued with large Fibres, *viz.* an Oxes being boiled to a tenderneſs. For in ſuch a one, if gently opening the fleſhy Fibres, you ſhall draw them one from another through the whole ſeries, you ſhall ſee little Fibrils, like hairs, moſt thickly extended upon every one of thoſe Tubes, which little Fibrils not only cloſe and knit together the fleſhy Fibres, but alſo lying upon every one of their ſeries, and cutting them in oblique Angles, they alſo are all carried parallel, from Tendon to Tendon, in an oppoſite ſite to the fleſhy: therefore whilſt the Muſcle being contracted, the fleſhy Fibres do ſwell up, the Fibrils embracing them, that they may give place, are ſomewhat diſtended; then as ſoon as the ſwelling up remits, theſe returning to their wonted ſtraitneſs, preſs together every where the fleſh, and the Spirits being expulſed on either ſide, they reduce them to their priſtine length. It makes for this, that whilſt the Muſcle is contracted, the Spirits inflowing through the Nerves, depart from their membranaceous Fibrils; wherefore theſe being empty and lax, are able more eaſily to be diſtended; but whilſt the Muſcle is relaxed, the Spirits again entring the Fibrils, fill them, and that they may the better bind the fleſhy Fibres, they make them ſhorter.

The

The Inſtincts of Motions, to be obeyed by the Muſcles, ſo delivered by the Nerves, are, being ſent either from the Brain, performed at the command, and with the knowledge of the Appetite; or from the Cerebel, according to the Laws of Nature, for the moſt part unknown to us. But beſides, ſometimes the Muſcles are carried beyond, or contrary to the pleaſure of the Appetite or Nature, into irregular motions, *viz.* violent and convulſive, and that happens after various manners and for divers cauſes. Concerning theſe, ſome time ſince diſcourſing more largely, we have ſhewn, that from thence do ariſe many kinds and differences of convulſive motions; as the Spaſmodick matter being ſomewhere fixed, doth ſubſiſt either about the beginnings, middle, or ends of the Nerves; or becauſe the ſame thing being wandring and looſe, runs about here and there through the whole paſſages of the Nerves, and ſo variouſly tranſfers from place to place convulſive diſtempers. But beſides theſe divers kinds of Convulſions, which are excited by reaſon of ſome evil or vice ſticking ſomewhere to the Nerves themſelves, this our Myology or Doctrine of the Muſcles, hath diſcovered ſome convulſions of another kind ariſing from the Muſcles being chiefly affected.

For indeed we muſt advertiſe you, that the animal Spirtis, diſpoſed among the Muſcles themſelves, by reaſon of a taint or evil derived from the Brain, or from the Blood, or perhaps oftentimes from both together, are infected with certain heterogene Particles, by reaſon of which they cannot reſt or lye quiet in their Cells; but being always unquiet and reſtleſs, leap out of their own accord from the tendinous Fibres into the fleſhy, and ſo oftentimes produce frequent and cruel Convulſions. But this we have obſerved to be done after a twofold manner, *viz.* firſt, for that the Spirits being burdened with an elaſtick Copula, remain not long within the Tendons, but leaping out from thence into the fleſhy Fibres, induce frequent Convulſions of a Muſcle, but ſhort, and as it were by leaps; or ſecondly, becauſe the animal Spirits, although they ſometimes lye quietly within the Tendons, yet being inordinately ſnatched into the fleſh, and there cruelly exploded, they cannot be preſently repreſſed, brought into order, or reduced into the Tendons, but whether we will or not, they perſiſt a long while expanded, and ſo bring forth a long and very painful contraction of the Muſcle, Which kind of Spaſm, ſufficiently known, we vulgarly term the Cramp.

The former diſtemper (called the Convulſive Leaping) is familiar both to malignant Fevers, and to the Scurvy. As to thoſe, we have ordinarily known, when either no Criſis, or an evil one is obtained, that heterogene Particles from the Blood and nervous juyce very much vitiated, are not only laid up in the Bowels, (whoſe diſpoſitions and functions they pervert) but almoſt every where in the Muſcles; and there growing to the Spirits, do affect them with a certain madneſs, ſo as they cannot continue peaceably together, or reſt within the Tendons, but being divided and diſtracted one from another, leap out from thence by bands into the fleſh, and there ſtir up the leſſer and moſt frequent Spaſms or Convulſions. In like manner, by reaſon of the Spirits inhabiting the Muſcles being burdened with an elaſtick Copula there growing to them, ſome labouring with an inveterate Scurvy, cannot contain their limbs in the ſame ſite or poſition, but are neceſſitated ſometimes to extend the hands or feet, ſometimes to fling them about here and there, to transfer them variouſly, and ſometimes to ſubdue their madneſs by running, leaping, or other hard labours.

Treating ſome time ſince of Convulſive Motions, we did almoſt wholly omit the Ætiology of the continuing Spaſm or Tetaniſm, as a thing which depended upon the Doctrine of the Muſcles, to be treated of afterwards: Then we only hinted, that the contraction of that kind did ariſe in one Muſcle, becauſe its other Antagoniſt was reſolved or looſned, which indeed oftentimes happens in the face and ſome members; in which, whilſt the parts upon one ſide are troubled with the Palſie, thoſe oppoſite on the other, as it were looſned in the Reins, are too much contracted. Notwithſtanding, this kind of Spaſm for the moſt part is without pain; beſides, this is not eaſily or preſently paſſed over or cured no more than the Palſie, which is the cauſe of it.

Therefore as to what belongs to the formal reaſon of the Spaſm, called in our Idiom the Cramp; every one labouring with this diſtemper, perceives in himſelf one or more Muſcles to be moſt ſtrongly and involuntarily drawn together, and they being for ſome time ſo highly diſtended, remain as it were ſtiff; and in the mean time, for that the fleſhy Fibres being cruelly contracted, do voilently haul or pull either Tendon, to wit, that which is fixed to the immoveable part, perhaps no leſs than the other part to be moved, they cauſe a moſt troubleſom pain. But ſometimes this Spaſm being excited, by reaſon of the animal Spirits carrying themſelves out impetuouſly into the fleſhy Fibres, doth not ceaſe until the ſame Spirits being returned into the Tendons, ſuffer the fleſh to be relaxed; therefore its neareſt cauſes will be both the greater impetuoſity of the animal Spirits among the fleſhy Fibres, with which they leap thither unbid; and alſo their long continuance or ſtay, for that they return back more ſlowly and difficultly into the Tendons. For the ſecondary cauſes may be reckoned, both the evil diſpoſition of the animal Spirits, and alſo the evil conformation of the Tendons, *viz.* ſometimes this, ſometimes that, and not ſeldom both together.

As to the former; this diſtemper, as other Convulſions, ſeems to ariſe, for as much as the animal Spirits, being burdened with heterogeneous Particles or an elaſtick Copula, at length being irritated, they are incited to the ſtriking of it off: which notwithſtanding, being thick and viſcous, and for that cauſe more tenacious, is not ſoon nor eaſily ſhaken off, but that the Spirits being ſtill provoked by the ſame, and ſhut up within the fleſhy Fibres, are longer detained in the expanſion: which thing perhaps happens not ſo much unlike, as when water and air being joyned together, make a bubble; which, if it be made of water, wherein a little Sope is put, is more tenacious, much more large, and continues longer than that made

made only of mere water. So we obſerve,that they who abound in thick and tartareous humors,are moſt obnoxious to theſe kind of Cramps, and beſides, that they who preſently ſleep upon drinking or eating groſs meats,after full eating;and eſpecially after a large and plentiful ſupper,do ſuffer moſt cruel aſſaults of this diſeaſe; but ſometimes the Tendons themſelves are found to be in the fault, for that they being too hard bound together or obſtructed, they do not eaſily admit the Spirits returning from the fleſhy Fibres. The obſtruction of the Tendons is the cauſe, the Gouty and Scorbutick people, whoſe Tendons ſalt and tartareous humors eaſily run into and obſtruct,are wont to be cruelly tormented with theſe kind of painful Cramps: But that the conſtriction of the Tendons doth ſometimes bring forth this diſeaſe, appears by this,for that ſome Women with Child, (as I have been often told) about the latter end of their Time, by reaſon of the Muſcles of the Abdomen being too much extended, are wont to be troubled with frequent Cramps only in the bottom of their Bellies. For the illuſtrating of this Pathology we will add this following Caſe

A Noble Woman, young and fair, ſome time ſince obnoxious to Hyſterick diſtempers, and now above two years ago to Convulſive, and in a manner Epileptical; of late, by reaſon of the frequent and moſt cruel aſſaults of the diſeaſe, ſhe became alſo Cachectical and Paralytical, that at length her Abdomen was diſtempered with an Aſcites, and her Legs with a wateriſh Tumor, and laſtly, all her lower parts, below her Hips, were deprived of motion; hence, as often as the Convulſive fits infeſted her, ſhe was wont, not now to move her body or members here and there, but ſometimes theſe, ſometimes thoſe parts being ſnatched with the Tetaniſm, were variouſly bent and twiſted about, that in the mean time, ſhe her ſelf ſitting in her Bed or Chair,remained ſtiff and almoſt immoveable. It is not long ſince,that ſeeing the whole manner of one of theſe Fits, I obſerved, not without great admiration, divers ſorts of turns and changes of alterations of the Spaſms. At the firſt aſſault,her eyes being turned about ſwiftly hither and thither, ſhe was preſently taken with inſenſibility, then by and by her head being turned and contracted of one ſide, preſently her arms and legs at once became ſtiff, and all her Joynts, ſometimes of one ſide, ſometimes of both, were bowed or ſtretched out: perhaps after four or five minutes theſe Spaſms both in her Head and Limbs remitting, of a ſudden others, for the moſt part oppoſite, followed; which being often finiſhed in the like ſpace, others far different did ariſe, and ſo for two or three hours, longer Spaſms almoſt of every kind and faſhion,being excited through her whole Body,followed upon one another;ſo that her head being convulſed or pulled by turns from the right to the left, and contracted before and behind, yea and all her Limbs being bent inwardly here and there, or diſtended outwardly in the courſe of one Fit, ſhe exhibited all ſorts of Convulſive geſtures. When at any time the Spaſms of one ſort continued longer in the Head or Limbs than uſual, it was the cuſtom of the Servants about her to blow up ſtrongly into her Noſtrils the Fume of Tobacco; which being done, as the Spirits recovered within,the preſent Spaſms immediately remitted, but upon them others of a new kind ſuceeded. Of late the Legs of this Lady were ſo debilitated by being looſned,that ſhe could neither go nor ſtand,yea her Tendons under either Ham,being made tumid and ſhorter, were ſo contracted, that ſhe could not ſtretch out her Legs ſtraight.

Concerning the caſe of this ſick Noble Lady, it may be demanded, wherefore upon the firſt coming of the Fit, no throwing about of the Body or Limbs, as is wont in moſt Convulſive or Epileptical people, but only continued Spaſms or Convulſions variouſly tranſlated from one part to another, and ſo others, did ariſe? For the ſolution of this, we ſay, that the Spaſmodick matter is not only heaped up in the Brain and Nerves, but alſo in the Muſcles themſelves, and grows to the Spirits inhabiting the Tendons: And as that matter is tenacious, and the Spirits weak, and unable for the ſtriking off quickly or eaſily ſuch a Copula; therefore as often as theſe being irritated, do leap out of the Tendons into the fleſh, the Muſcles being firſt poſſeſt,they cauſe ſtrong and long Contractions; in the mean time,other Muſcles,eſpecially their Antagoniſts or oppoſites, being hindred and bound up from motion, until the Convulſions of the former are remitted; hence the Members, however convulſed, are not moved out of their place, becauſe the moving or carrying of the Body, or any Members, is not performed but by the help or duty of many Muſcles, whilſt ſome of them either rightly cooperate with others, or at leaſt obey them, to wit, ſo that ſome reſpective Muſcles, obſerving due cooperation, are contracted at once, then thoſe being looſned, the contraction of others immediately ſucceeds. But if they which are unequal and unlike,are at once,contracted and ſtrongly convulſed, and ſo continue long, ſo that other Muſcles in the mean time cannot be contracted, there will be a neceſſity for the members bent or extended here and there, to remain as they are wholly ſtiff. But that the preſent Convulſions were always remitted by the blowing the ſmoke of Tobaco up her Noſe, the reaſon is, becauſe the region or ſome part of the bodily Soul being vehemently affected,if by chance a new paſſion equally violent be brought upon another part,the firſt is preſently aboliſhed or ceaſes: For in truth, it appears by conſtant obſervation, where-ever the greater or freſher trouble is, that thither greater plenty of Spirits preſently flock and make a tumult: wherefore any new irritation being excited in the Brain or its Meninges, whatſoever others were begun outwardly among the Muſcles, immediately vaniſh or are obſcured; then as ſoon as this freſh trouble is paſſed over,Convulſions outwardly ariſe forthwith again,but in other parts where more heaps of Spaſmodick matter lye not yet conſumed. But that long continued Spaſms do ariſe,either by reaſon of the Spirits being burdened with a more tenacious Copula, or by reaſon of the Tendons being obſtructed with a viſcous or tartareous matter from either or both, it appears from hence, becauſe this diſeaſe increaſing (as in the caſe of this Noble Lady) the Tendons are at length ſo ſhortned by the more plentiful heaping up of the morbifick matter,that they become

come ſtiff and ſhorter, and for that reaſon they hardly or not at all grant any place to the Spirits for the conſtant performing of the motive function.

Thus much for the Muſculary Motion, both natural and convulſive, and the reaſons of both, which we have proved with what diligence we are able, and by Anatomical Experiments: But if any one ſhall object, that they are not very firm, becauſe we have noted in the cutting up of live Creatures, that the Heart and Muſcles of Reſpiration and the fleſhy Pannicle, after that the Nerves and Arteries are cut away, do continue for ſome time their turns of Contraction and Relaxation, whence it is argued, againſt our Hypotheſis, that their motions do not depend upon the conſtant influx of the blood and animal Spirits; it will be plain to return this Anſwer, That in thoſe about to dye, it ſometimes happens ſo, becauſe the Soul being then diſtracted and drawing near to diſſolution, all the implanted Spirits at once being cut off from the commerce of thoſe influencing or flowing in, do of their own accord exert themſelves, and perform (as long as they are able) their wonted motions; which being continued for a little ſpace only, need not the ſubſidy or aſſiſtance of freſh forces, becauſe the veterane, till they are quite worn out, perform their wonted tasks; yea alſo the old ſanguineous Copula, till it be wholly conſumed, receives and lets go their embraces with a conſtant change; But this more rarely ſucceeds in other Muſcles ſubject to the Empire of the Appetite, and wont only to be exerciſed as occaſion ſerved.

Moreover, as we have affirmed, that the Inſtinct for the performing of Motions is brought altogether through the Nerves from the Head to the Muſcle, and as every Trunk of the ſame Nerve, being oftentimes broken into many ſhoots, variouſly diſtributing them, ſends it to many deſtinated Muſcles, it may very well be doubted, how the animal Spirits, conveying the Symbol of the motion to be performed with a certain choice, do actuate only theſe or thoſe branches apart from other branches of the ſame, and do not indifferently enter all the branches or ſhoots of the ſame; to wit, as the blood paſſes through the Trunk of the Artery, and all its ramifications equally. The moſt Learned *Regius*, that he might ſolve this knot, ſuppoſes in the Nerves ſome little doors, like to thoſe which are found in muſical Organs, the apertures whereof admit the Spirits to theſe or thoſe parts eſpecially, the reſt being ſhut up. But he ought to have ſhewn, if not the little doors themſelves, yet at leaſt by what inſtinct and by whoſe direction ſometimes theſe, ſometimes thoſe are locked up, and others opened. But in truth, this may rather be ſaid, that all the ſhoots of the Nerves and leſſer branches remain diſtinct and ſingular among themſelves from the parts to which they are inſerted, even to their beginnings; ſo that a peculiar tract of the Spirits or way of paſſage lyes open from the Brain and its medullary Appendix, to every Muſcle and nervous part; for in truth, although the Nerves, according to their beginnings, may ſeem to ariſe from the greater Trunks; yet it will eaſily appear, if you ſhall open the trunk and thoſe branches, that in them many little Nerves, only like hairs, for the ſake of a better conduct, are collected together in the ſame bundle; yea, the coverings being ſeparated, you may follow oftentimes the little Nervulets, and thoſe ſingle to the reſpective parts and members, to which they are deſtinated.

But in the mean time, although there be ſingular paſſages or chanels of the animal Spirits of moſt Nerves, diſtinct among themſelves; yet ſome do variouſly communicate with others through the branches and ſhoots ſent on either ſide; which indeed ought to be ſo made, that when many Nerves together, are required to ſome motion of a Muſcle equally, all theſe, by reaſon of the commerce mutually had between themſelves, might conſpire in the ſame action, hence, in ſome motions of the members, as in the ſtriking of a Harp or Lute and other complicated actions, many Muſcles cooperate with admirable celerity; ſo that, although many be imployed at once, they perform their task ſeverally without any confuſion. Beſides, there is need for the Nerves to communicate mutually among themſelves, becauſe of the Sympathetical motions of the members and of ſome of the parts, for neither for any other cauſe is the Nerve of the Diaphragma inſerted into the brachial branches, or thoſe belonging to the Arms, than that the exerciſe of living Creatures, eſpecially in running or flying, might be proportionate to the tenour of Reſpiration. Hence it alſo proceeds, that in any paſſion, the Præcordia being bound up or dilated, the countenance and aſpect of the face, yea and the geſtures of the hands and members are pathetically figured. We have propoſed ſufficient Inſtances of this ſort in our particular Hiſtory of the Nerves, ſo that we need not here add any thing more.

What remains for the illuſtrating our Myology or Tract of the Muſcles, we have taken care to have added, *viz.* four Figures, which may repreſent to the life both the exteriour and interiour true and natural faces or appearances both of a ſimple and compounded Muſcle.

The Explication of the Figures.

The First Figure

Shews a simple regular Muscle, described according to its natural appearance, in the Belly of which the fleshy Fibres being opened, are diduced one from another, that the membranaceous Fibrils may be the better beheld.

A. *The right Tendon.*
B. *The left opposite Tendon.*
C. *The fleshy Belly; all the fleshy Fibres of which lye one by another equal and parallel, but in even and oblique Angles between either Tendon.*
D. *The aperture of the fleshy Fibres, which being drawn aside, the membranaceous Fibrils, thickly crossing them, appear.*

The Secod Figure

Shews a simple Muscle cleft in the middle, after the Tendon being cut off, and portions of it pulled away, that the interiour series of the fleshy Fibres, or their commixtures or mingling with the Tendons, may appear.

AA. *The right Tendon being placed above, both portions of which divided, do in some measure appear.*
BB. *The left opposite Tendon placed below, either portions of which divided, lye hid for the most part under the Flesh, those towards the edges being only conspicuous.*
CD. *Portions of the fleshy Belly divided and separated, which before (this being laid upon that) did cohere, in either of which all the fleshy Fibres proceed equally, and in like manner obliquely from one Tendon to another.*
E. *Some membranaceous Fibrils represented, thickly crossing the fleshy Fibres.*

The Third Figure.

Exhibits a certain Muscle less compounded, to whose two fleshy Bellies two compounded Tendons also (equal to four simple ones) are destinated.

A. *The exteriour compounded Tendon, embracing either side of the fleshy Fibres, which being almost only conspicuous on the edges, lies hid for the most part under the Flesh.*
B. *The interiour compounded Tendon, entring into the middle of the Flesh, which receives on both sides the fleshy Fibres, sent from either side of the exteriour Tendon.*
C. *The first Belly of the fleshy Fibres, all whose equal and parallel Fibres lye between the opposite sides of the Tendons in oblique Angles and equal.*
D. *The second Belly of the fleshy Fibres, all whose Fibres being in like manner formed, are beheld in the same as in the other Belly.*
EE. *Both extremities of the exteriour compounded Tendon.*
F. *The extremity or end of the interiour compounded Tendon, the like to the other being opposite, at an equal distance from the end of the Muscle.*

The Fourth Figure.

Shews a regular compounded Muscle, divided and opened in the middle, so that the interiour face of either Belly may appear.

A. *The exteriour compounded Tendon cleft into four parts.*
BB. *Portions of one side of the divided Tendon separated from the other.*
C. *Portions near sited, of the other side of the divided Tendon, which for the greatest part lye hid under the flesh.*
DD. *The flesh of one Belly also divided, and separated one far from another.*
EE. *The flesh of the other Belly also divided, and placed near one another.*
F. *The interiour compounded Tendon entring the middle of the Flesh.*
GG. *Portions of the same Tendon divided, and with portions of the Bellies, which they receive, separated apart.*

THE

Fig. I.

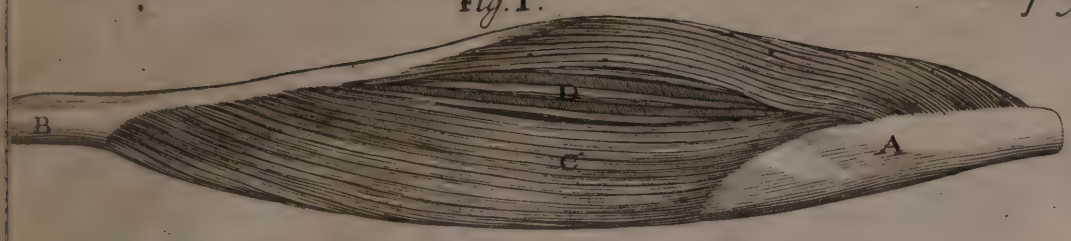


Fig. II.

Fig. III.

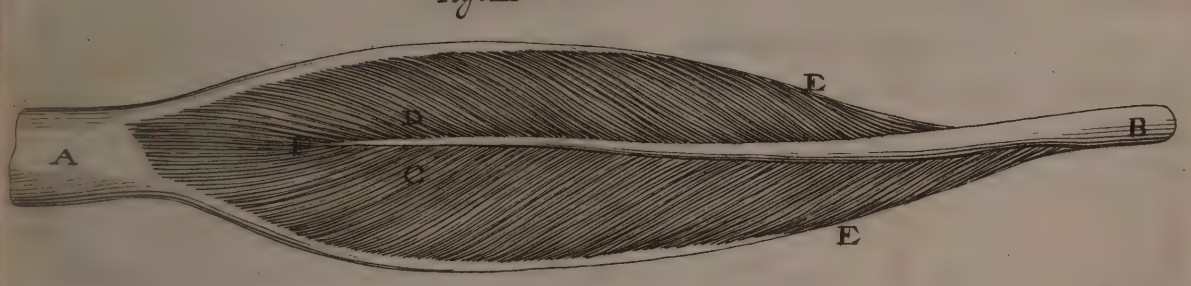
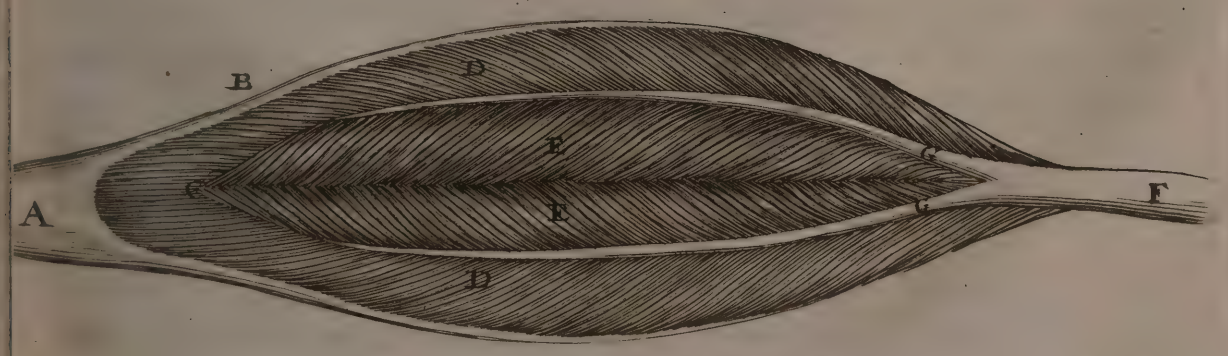


Fig. IV.



THE ANATOMY OF THE BRAIN.

The Authors Epiſtle Dedicatory to his Grace Gilbert *Archbiſhop of* Canterbury, *&c.*

Moſt honourable Prelate,

ONCE more your *Sidley* Profeſſor and your Servant (the more happy Title) flings himſelf at Your feet, with this only Ambition, that he might render ſomething of Thanks for Your Kindneſs and benefits, and that our Labours might chuſe ſuch a Patron, that might give Credit to the Author. But I fear, leſt by my repeated Duty I may ſeem troubleſom, and no leſs in acknowledging Your Benefits, than others in ſuing for them: But ſo great is my Gratitude, and ſo exceeding is your good Nature, that they cannot be crowded into a little compaſs, much leſs wearied out or drawn dry.

But there is another reaſon, which if it doth not command what I do, may at leaſt excuſe and defend it. For when I had reſolved to unlock the ſecret places of Mans Mind, and to look into the living and breathing Chapel of the Deity (as far as our weakneſs was able) I thought it not lawful to make uſe of the Favours and Patronage of a leſs Perſon, neither perhaps would it have become me. For You indeed are He, who moſt happily preſides (both by Merit and Authority) over all our Temples and Sacred Things. Therefore after I had ſlain ſo many Victims, whole Hecatombs almoſt of all Animals, in the Anatomical Court, I could not have thought them rightly offered, unleſs they had been brought to the moſt holy Altar of Your Grace.

I am not ignorant, how great the labour is that I undertake: For it hath been a long while accounted as a certain Myſtery and School-houſe of Atheiſm to ſearch into Nature, as if whatever Reaſons we grant to Philoſophy, ſhould derogate from Religion, and all that ſhould be attributed to ſecond cauſes, did take away from the firſt.

But truly, he doth too much abuſe the Name of Philoſophy, who conſiders the wheels, curious frame, ſetting together, ſmall pins, and all the make and proviſion of a Clock, by which invented Machine the courſe of the Time, the orders of the Months, the changes of the Planets, the flowing and ebbing of the Sea, and other things of that kind, may be exactly known and meaſured, if that at length, when by this his ſearch and conſideration, he hath profited himſelf ſo much, he ſhould not acknowledge the Artiſt, to whoſe Labour and Wit he owes all thoſe things.

I am ſure I am of another mind and opinion, who look into the Pandects of Nature, as into another Table of the Divine Word, and the greater Bible: For indeed, in either Volume there is no high point, which requires not the care, or refuſes the induſtry of an Interpreter; there is no Page certainly which ſhews not the Author, and his Power, Goodneſs, Truſt, and Wiſdom.

In the mean time, there is no right Weigher of things that can lay to our charge as a fault, that we have ſtudied theſe Rolls of Nature, becauſe ſome Atheiſts may be made thereby; which may be objected to the ſtudies of Divines in Sacred Letters, that from their proviſion Hereticks have taken their Arguments and Opinions, and turned them againſt them and Godlineſs.

That I may deal freely, whoever profeſſes Philoſophy, and doth not think rightly of God, I do judge him not only to have ſhaken hands with Religion, but alſo with Reaſon, and that he hath at once put off Philoſophy as well as Chriſtianity. Therefore I deſire, that all mine may be tryed and approved, no leſs by the demonſtration of Piety and Canons of the Church, than by the Rule of Experience and Knowledge, to which I keep: Neither do I intreat and reſpect only the *Mecænas* of humane Arts, but alſo the Primate and chief of Divine, whilſt I openly profeſs my ſelf, with all due obſervance,

YOUR GRACES

Moſt humble and obliged Servant,

THO. WILLIS.

THE

THE PREFACE TO THE READER.

THE *Romans ſometimes promiſed to themſelves an Empire, an Eternity by the happy Augury of an humane Head being turned out of the Glebe; neither could they perſwade themſelves, that the Capitol ſhould be the Head of the World, unleſs it had been built upon the Skull of a Man. I do not think of Empires in Arts, nor do I promiſe to my ſelf Triumphs by overcoming the World of Letters: But in the mean time, I had wholly fruſtrated thoſe Illuſtrious Documents I had long ſince learned, unleſs with thoſe Auſpices I had laboured in Philoſophy, eſpecially the Natural.*

For the Province, which I hold in this Academy, requiring that I ſhould Comment on the Offices of the Senſes, both external and alſo internal, and of the Faculties and Affections of the Soul, as alſo of the Organs and various proviſions of all theſe; I had thought of ſome rational Arguments for that purpoſe, and from the appearances raiſed ſome not unlikely Hypotheſes, which (as uſes to be in theſe kind of buſineſſes) at length accrued into a certain Syſtem of Art and frame of Doctrine. But when at laſt the force of Invention being ſpent, I had handled each again, and brought them to a ſeverer teſt, I ſeemed to my ſelf, like a Painter, that had delineated the Head of a Man, not after the form a Maſter, but at the will of a bold Fancy and Pencil, and had followed not that which was moſt true, but what was moſt convenient, and what was rather deſired than what was known. Thinking on theſe things ſeriouſly with my ſelf, I awaked at length ſad, as one out of a pleaſant dream; to wit, I was aſhamed that I had been ſo eaſie hitherto, and that I had drawn out for my ſelf and Auditors a certain Poetical Philoſophy and Phyſick neatly wrought with Novity and Conjectures and had made a Fucus *as it were with deceits and incantations for either of us.*

Wherefore all delay being laid aſide, I determined with my ſelf ſeriouſly to enter preſently upon a new courſe, and to rely on this one thing, not to pin my faith on the received Opinions of others, nor on the ſuſpicions and gueſſes of my own mind, but for the future to believe Nature and ocular demonſtrations: Therefore thenceforward I betook my ſelf wholly to the ſtudy of Anatomy: and as I did chiefly inquire into the offices and uſes of the Brain and its nervous Appendix, I addicted my ſelf to the opening of Heads eſpecially, and of every kind, and to inſpect as much as I was able frequently and ſeriouſly the Contents; that after the figures, ſites, proceſſes of the whole and ſingular parts ſhould be conſidered with their other bodies, reſpects, and habits, ſome truth might at length be drawn forth concerning the exerciſe, defects, and irregularities of the Animal Government; and ſo a firm and ſtable Baſis might be laid, on which not only a more certain Phyſiologie than I had gained in the Schools, but what I had long thought upon, the Pathologie of the Brain and nervous ſtock, might be built.

But for the more accurate performing this work, as I had not leiſure, and perhaps not wit enough of my ſelf, I was not aſhamed to require the help of others. And here I made uſe of the Labours of the moſt Learned Phyſician and highly skilful Anatomiſt, Doctor Richard Lower, *for my help and Companion; the edge of whoſe Knife and Wit I willingly acknowledge to have been an help to me for the better ſearching out both the frame and Offices of before hidden Bodies. Wherefore having got this help and Companion, no day almoſt paſt over without ſome Anatomical adminiſtration; ſo that in a ſhort ſpace there was nothing of the Brain, and its Appendix within the Skull, that ſeemed not plainly detected, and intimately beheld by us. After this, when we entred upon a far more difficult task,* viz. *the*

Anatomy

Anatomy of the Nerves, then very much appeared the plainly to be admired skill of this Man, as also his indefatigable Industry, and unwearied Labour: For having prosecuted, with a most exact search, all the divarications, wandring on every side of the Nerve, how minute or small soever, and immersed, and variously infolded within other Bodies, and so turning over the Labyrinths of the Branches, and shoots of every pair, far and near diffused, he drew out with his own hand the Schemes, Images, or Draughts of them, and also of many passages of the Blood, as they appear in this Tract; which indeed, that they might be faithfully and most exactly shewn, without any falsity or errour, he caused, that no Table might contain scarce any line or the most light passage, whose conformation and exact habitude he had not found proved by the marks or inspection of many Animals for that purpose killed.

Besides the helps brought me by his most skilful dissecting hand, it becomes me not to hide, how much besides I did receive from these most famous Men, Dr. Thomas Millington *Doctor in Physick, and* Dr. Ch. Wren *Doctor of Laws, and* Savill *Professor of Astronomy; both which were wont frequently to be present at our Dissections, and to confer and reason about the uses of the Parts. Besides, the former most Learned Man, to whom I from day to day proposed privately my Conjectures and Observations, often confirmed me by his Suffrage, being uncertain in my mind, and not trusting to my own opinion. But the other most renowned Man,* Dr. Wren, *was pleased out of his singular humanity, wherewith he abounds, to delineate with his own most skilful hands many Figures of the Brain and Skull, whereby the work might be more exact.*

But although instructed by these helps, and as it were hem'd in by the plentiful assistances of these Illustrious Men, I come forth on the Stage, I presume I shall not be however safe from calumny, and free from blame and most just reprehension: because here is inquired into the recesses and most inward dens of the Brain, and its depending parts as it were shut and sealed up; concerning the certain uses of which, scarce any thing may be brought forth, but that, as it may be published and shewn, for the Judgments of the more Learned, so it may be carpt at and torn by the opprobries of detractors. In other parts, where matters appear to the Senses, we do not so easily run upon errours. For in most of the Viscera and Vessels, the Contents and contained humors, as also their passages within the larger Cavities of the containing parts, are discerned by the sight: But in the Brain and Nerves, neither the rushings on or impressions, viz. *the Animal Spirits themselves, nor their tracts or footsteps, can any ways be seen. Wherefore to explicate the uses of the Brain, seems as difficult a task as to paint the Soul, of which it is commonly said, That it understands all things but it self: for in truth, the unwearied labour of the Brain beholds or searches the hidden places of other Bodies, in the mean time the œconomy or regiment of its own Family and Kingdom being wholly hid and unknown.*

But what we profess to be performed by us in the following Tract, and hope for the future from the help or labour of others, is chiefly this; to wit, that we have not rashly described the parts themselves, of which the Anatomy is instituted, but that we have with diligent care and great trust collected the various appearances and Arguments of Observations by a manifold Dissection. Which things, if you shall delineate out of those Sentences and granted Decrees, as it were to a Mathematical Rule, and from thence would collect a Theory as yet lame, and that may not appear absolute in all its numbers, no doubt but that a longer time, and the getting of more Observations may give it a more perfect form, that Antiquity may not have said altogether in vain, That Minerva *was born from the Brain,* Vulcan *with his Instruments playing the Midwife: For either by this way,* viz. *by Wounds and Death, by Anatomy, and a Cæsarean Birth, Truth will be brought to Light, or for ever lye hid.*

THE

THE ANATOMY OF THE BRAIN.

CHAP. I.

The Method or Anatomical Administration of Dissecting the Brain is proposed.

AMong the various parts of an animated Body, which are subject to Anatomical disquisition, none is presumed to be easier or better known than the Brain: yet in the mean time, there is none less or more imperfectly understood. All of it that appears, and is commonly described in the forepart or forehead, is beheld almost at a sight or two after some rude cutting up; but if you seek what lyes hid in the recesses for that end, new bosoms and productions of Bodies, before hid, are every where laid open: yea the parts of the Brain it self are so complicated and involved, and their respects and habitudes to one another so hard to be extricated, that it may seem a more hard task to institute its perfect Anatomy, than to delineate on a plain, the flexions and Meanders of some Labyrinth: Because, as we are not able to estimate the measure or to paint forth the pattern or draught of the frame of this, so neither of that, unless the bulk or substance of the subject be first searched to the bottom, and its frame broken into pieces. Hence it came to pass, that the old Anatomists in dissecting the Brain, not sufficiently attending what was placed first, what second, and what after that in the order of Nature, cut its Globe as it were into slices or parts, and the Phænomena arising by chance from such a dissection, they easily esteemed for true parts of the Brain; when yet in the mean time, by others from a dissection otherwise made, the parts and processes of it appear far different from the former. The reason of which is, because the substance or frame of the Brain and its Appendix lyes so within the Skull, that there are many swellings or tuberous risings, with several tails or little feet compacted together: all which, although distinct one from another, and are endued with figures diversly expanded; yet they, that they may be contained in a lesser room, are thrust as it were into the same Globe, and so complicated among themselves, that it is a hard thing to find out where the beginning and end of the Brain, as also where the limits and partitions of the near adjoyning parts do remain; further, that the several parts of the Encephalon so complicated, may retain their site, nor presently being loosned one from another, may spring forth, they are knit together into due foldings, with Fibres and Membranes stretched out from part to part. And as often as the substance or bulk of the Brain so conglobated or rolled together is cut, there is as often a necessity that the slips being cut, the portions of divers parts cleaving together, are carried away with them. Wherefore that a true and genuine description of the Brain might be shewed before its substance and continuity is dissolved, before all things its whole frame or substance ought to be explicated, and the knitting of the Membranes being wholly loosned, the several parts ought to be turned over and stretched forth into their proper dimensions. By what means these things may be done, and by what Method the dissection or Anatomical administration of the Brain may be best performed, ought here in the first place to be shewn; then these things being first done, we will more largely deliver the Description of the Brain, together with the use and action of its several parts.

That

That the perfect knowledge of the Brain and its parts may be gained, it is neceſſary not only to diſſect and look into mens Heads, but all other kind of living Creatures heads; for beſides, that the humane Heads or Bodies are not ſo readily to be had, that one may from day to day behold the Brain and its frame, and carefully conſider the ſituation of the parts, and ſearch one after another their reſpects, habitudes, and dependencies; beſides alſo the immenſe bulk of an humane Head is in it ſelf an hinderance, whereby its moſt intricate frame and various receſſes and Appendices are the leſs accurately diſcerned and inveſtigated: all which being reduced into an Epitomy, are plainly repreſented more commodiouſly in the diſſection of Beaſts. Wherefore when the form and compoſition of the Brain in a Dog, Calf, Sheep, Hog, and many other four-footed beaſts, were little different (the magnitude only excepted) from the figure of the ſame, and the diſpoſition of the parts, in a man, I was the more ſatisfied to compoſe a certain Anatomy of the Brain by the frequent diſſection of all ſorts of living Creatures. And in this imployment, for that I ſhall ſhew the communities and differences which the ſubjected parts obtain in various Animals, compared among themſelves, and with man; certainly from ſuch a compared Anatomy, not only the faculties and uſes of every Organ, but the impreſſions, influences, and ſecret ways of working of the ſenſitive Soul it ſelf will be diſcovered. Concerning the Heads of living Creatures, in the diſſection of which it happened for us chiefly to be exerciſed, it was obſerved, as to the chief parts of the Head, that there was a notable Analogy between Man and four-footed Beaſts, alſo between Birds and Fiſhes: For when the firſt Inhabitants of the new-made World were produced, as one day brought forth Fowl and Fiſhes at once, another in like manner Man and four-footed Beaſts, ſo there is in either twin ſpecies a like form of the Brain; but between that Child of the former, and this of the following day, there is found a great difference as to thoſe parts. For as much therefore as Men and four-footed Beaſts have got more perfect Brains, and more alike among themſelves, we have ordered our Obſervations from their Inſpection: Then afterwards we ſhall deliver the Anatomy of the Brain in Fowl and Fiſhes. And here firſt concerning the Heads of Men and four-footed Beaſts, (as we hinted but now) we will propoſe a Method of Diſſection it ſelf, or of Anatomical Adminiſtration, and will at once recite all the parts one after another, and as it were in a compendious Catalogue; then we will by and by more largely draw out the Particles of the Brain and of its Appendix, ſo ſhadowed, in a ſhort Table, and will deſign their uſes and actions for the exerciſe of every faculty.

When therefore we had in our hands the Head of a Man, or Dog, Calf, or Sheep, its more outward coverings were taken off; concerning which, as they are well enough known, we are not at all ſolicitous: then the covering of the Skull being divided by a Saw or Inſtrument, and taken away, on every ſide the bones are broken off with a pair of Sciſſers or a Penknife to the Baſis of the Skull, that ſo the Contents might, as much as may be, be all made plain or open to the Spectators. What therefore comes firſt in view is the hard Meninx including all the reſt with a common covering. This Membrane outwardly and above is knit to the Skull in divers places, eſpecially about the Sutures; but indeed about the foot or Baſis it moſt ſtrictly cleaves to the bones, ſo that it cannot eaſily be pulled away. Inwardly (or in its hollow ſuperficies) it is lax and looſe enough, unleſs that nigh all its boſoms by the inſertions of the Veins, and in the Baſis of the Skull by the Arteries and the Nerves it is tyed to the *Pia Mater*.

This ſame Membrane between the *Interſtitia* or diviſion of the Brain, and beſides of the Cerebel it ſelf inſinuating it ſelf deeply on one ſide, and riſing up again on the other, leaves ſome duplicatures or infoldings, in which, being ſhut up above by the increaſe of the ſame Membrane, Cavities, which they commonly call Boſoms, are formed: to wit, by this means, almoſt the three firſt boſoms are conſtituted; but the fourth is a ſmooth and longiſh, and alſo hollow proceſs of the ſame Membrane, which is ſent through the *Interſtitia* of the Brain, nigh the end of the callous body, even to the pineal *Glandula*. The Cavities of the greater Boſoms are ſevered in many places, as it were into little Cells; as it ſeems for that end, that the blood paſſing ſo through the various turnings in thoſe ends, may be hindred from a more rapid motion.

Beſides, this Meninx or Film of the Brain admits two Arteries from either ſide, one conjugation of which ariſes not far from the Carotick Arteries through the holes of the Cuniform bone, but the other from the bone of the Forehead: all which indeed being diffuſed through the exteriour ſuperficies of the Membrane, water it; but are terminated, partly in the Skull, eſpecially nigh the Sutures, whither they convey the blood, and partly in the boſoms, where, what is ſuperfluous is laid up. Moreover, theſe Arteries perforate the hard Meninx in ſeveral places on the top of the Brain (as *Webſer* obſerves) and impart ſome ſhoots to the *Pia Mater*. Laſtly, the exteriour ſuperficies of this Meninx is no where planted with ſo many ſhoots of Veins as Arteries; but from its four Boſoms (which are the veinous Receptacles of the blood) many Veins go out through the interiour ſuperficies of this Membrane, which being inſerted in the *Pia Mater*, are preſently diſperſed through its whole compaſs, and the ſame ſliding down on every ſide from the boſoms, meet every where the Arteries aſcending from the Baſis of the Head, and being intermingled with them, conſtitute the manifold infoldings of the Veſſels.

That theſe may be the better beheld, after the Arteries are ſufficiently noted, let the hard Meninx be cut round near the border of the broken Skull; then let whatever of it ſerves for a covering and partition to the Brain and Cerebel, be lifted up, that the goings out of the Veſſels, *viz.* the Veins and their diſtributions into the *Pia Mater* may be conſidered: which being afterwards broken aſunder, let the Membrane with its boſoms be wholly taken away; but the reliques of this Membrane,

which

which ſtick to the bones at the bottom of the Skull, ſhould be ſeparated, ſo that the whole frame or ſubſtance of the Brain and its Appendix may be ſomewhat elevated, and moved here and there be every where conſpicuous, and at length taken from the Skull. But that theſe things may be performed, you muſt begin from the anterior or fore part, where the bone of the Forehead ſeparates it.

Therefore if the prow of the Brain, hid under this bone, be a little lifted up, the mammillary proceſſes come preſently in ſight, together with the ſmelling Nerves hanging to them: which being diſſected near the Inſertion, there will appear an hollowneſs in either proceſs. Theſe are large and round, alſo full of clear water in Calves: but in either ſmelling Nerve a manifeſt Cavity is found continued on either ſide to the anterior Ventricles of the Brain, to which if a Pipe be put and blown into, preſently the whole ſubſtance of the Brain will ſwell.

Next the ſmelling Nerves about the Cocks comb, two ſmall Arteries are ſeen to ariſe from the Skull, and to be carried towards the *Interſtitium* of the Brain, which in truth are branches of the Carotides, which are knit to the dilated Comb before, and from thence are ſeen to be reflected to the anterior Brain.

Theſe Veſſels being there diſſected, the coming together and going out of the Optick Nerves follow; the trunk of which being cut off a little lower, the Tunnel, and out of both its ſides the Arteries called *Carotides*, ariſing out of the Cuniform-bone, do appear; which are more clearly beheld, if the Brain be lifted up. Theſe alſo being cut off, and the Brain farther bent back, the moving Nerves of the Eyes preſently ſhew themſelves; and ſo from thence the other pairs of Nerves follow in order, that one pair of them being cut off, and the Brain with its Appendix more lifted up, the next is ſtill obvious to thoſe beholding it, till all the Nerves ariſing within the Skull, and alſo the Arteries, both the Carotides, and the Vertebral being at length cut off, the whole frame of the Head may be taken out of the Skull.

But (that theſe Veſſels may be deſcribed in the ſame order as they are met with in the cutting them up) two ſmall Nerves follow after thoſe moving Nerves of the Eyes, which, for a reaſon hereafter rendred, we call Pathetick. Theſe Nerves higher than the reſt, ariſing behind two round Prominences called *Nates* and *Teſtes*, (the Buttocks and Stones of the Brain) and bending down forward, and entring for a little ſpace under the *dura Mater*, then coming out through the ſame hole, together with the former, from the Skull, are propagated into the ſight of the Eye. This pair is called by *Fallopius* the eighth, by us the fourth.

Beneath theſe little Nerves, from both ſides of the annulary protuberance, (which being ſent from the Cerebel compaſſes the oblong Marrow) two Nerves of noted magnitude ariſe, which, after they have paſſed through the *dura Mater*, ſend forth another notable branch on either ſide ſtraight down without the Skull, the other branch, by a longer tract, paſſing through both ſides the Skull near the Turky Chair. Theſe Nerves (as is ſhewn afterwards) having gotten a larger Province, are inlarged in the Palate, the parts of the Mouth and Face, and alſo their branches in the Noſe and Eyes, yea they impart roots to the intercoſtal Nerve. We call this pair the fifth, commonly eſteemed the third.

Nigh to the beginning of theſe, out of the loweſt foot of the oblong Marrow or Pith, two leſſer Nerves, endued with a ſingle trunk, ariſe, which being dilated forward, and preſently entring under the *dura Mater*, come out of the ſame hole with the moving Nerves of the Eyes, and are all carried into the balls of the Eyes. This pair is called by us the ſixth.

Next to theſe Nerves follow the auditory or hearing pair, which indeed ariſes higher from the ſides of the oblong Marrow, in what part the Cerebel is hanged to it; *viz.* nigh the leſſer annulary proceſs; from whence it is immediately carried with a double proceſs into the hole of the ſtony Bone: one of its branches is harder, ſerving chiefly for motion; the other altogether medullary and ſofter, as it were only deſtinated to ſenſe.

A little lower ariſes the wandring pair, which is commonly called the ſixth. This ſeems to be made of many Nerves, many of which ariſe together; and to them comes another, endued with a greater trunk, which being brought from the end of the oblong Marrow, yea beyond this, out of the ſpinal Marrow, is united with the former. And ſo all being made like a bundle of Nerves, go out through the hole of the hinder part of the Head; through which alſo goes out the greater branch of the internal jugular Vein. This is by us called the eighth pair.

Under the wandring pair, almoſt out of the Baſis of the oblong Marrow, another pair ariſes, conſiſting alſo of many Fibres, which going ſtraight down, and being preſently immerſed in the *dura Mater*, comes forth again through a peculiar hole out of the Skull; then either Nerve being inoculated into the trunk of the wandring pair, is preſently bended back towards the Tongue. In a man a peculiar protuberance grows above the oblong Marrow, out of which the beginning of this Nerve proceeds. This we call the ninth pair.

Below this, in the loweſt part of the hinder part of the Head, out of the ſides of the oblong Marrow, where it is about to go into the ſpinal, another pair, conſiſting alſo of many Fibres, ariſes; which tending towards the ſpinal Marrow, enters the *dura Mater* at the ſame place where the Vertebral Artery aſcends into the Brain; yet it ariſes out of the boſoms of the bones, but below the firſt Vertebra or Joynt, from whence it is carried into the Muſcles of the hinder part of the Neck, ſo that it is doubtful, whether this pair ought to be called the laſt of the Skull, or the firſt of the *Vertebrals*.

When theſe parts, *viz.* the aforeſaid Nerves and Arteries, both the *Carotides* and the *Vertebrals*, with the jugular Veins (by which the *Encephalon* is faſtned to the foot or baſis of the Skull) are cut off, and their ends ſtretched out as much as may be; either let them remain in the taken out ſubſtance or frame, whereby the beginnings of all the Nerves may be plainly noted; or the trunks of them being cut off near the roots, may be left in the holes of the Skull, whereby their goings out and diſtributions may be obſerved. The images of either Example are delineated in the firſt and ſecond Table.

The buſineſs of Diſſection being thus far brought, the reſidue of the Skull ſhews many things worthy conſideration, of which we ſhall ſpeak particularly afterwards. But firſt we ought to view throughly the taken out frame or ſubſtance of the Brain, together with its Appendix, and to examine all its appearances as they follow in the order of Diſſection.

The ſubſtance or Bulk being taken out, which is of a ſomewhat round figure or ſpherical, it exhibits to the ſight in its ſuperiour and convex part the Brain and Cerebel; but the oblong Marrow, with the utmoſt borders or edges of the ſuperiour bodies, poſſeſſes almoſt all the baſis or its loweſt part. The thinner *Meninx* covers theſe three placed near, and the outward ſuperficies of them all: nor doth it clothe the ſame looſly, but deeply inſinuating it ſelf into all their cavities and receſſes, covers and binds them ſtrictly. And as this Membrane is every where interwoven, with the folds of the Veſſels, by its ſtretching out, it reaches the ſame to every part and portion, and ſo waters the whole with a ſufficient afflux of blood. Here we muſt conſider the Veſſels of this Membrane and its protenſion.

As to the former, the whole ſuperficies of the frame of the ſubject may be ſeen, covered with the infoldings of Veſſels, as it were with a net admirably variegated or flouriſhed, and its ſight or aſpect ſhews like the picture of a fruit-bearing wood; the *Idea* of which, the Veſſels of the Brain more aptly repreſent, and are themſelves ſeen better and more diſtinctly, if you firſt ſquirt into the Carotidick Artery ſome black liquor. The Veſſels interwoven within the thin *Meninx* or *Pia Mater* are Arteries and Veins. The Arteries are four, *viz.* two *Carotides* and two *Vertebrals*. Out of either ſide of the Tunnel the ends of the cut off *Carotidick Arteries* ſhew themſelves, the trunks of which aſcending upwards, are preſently diffuſed from either ſide into the anterior and poſterior, or fore and hinder branch. Either pair of theſe inclining one towards the other, are mutually conjoyned: moreover, the poſterior branches ſo joyned, are united with the Vertebral branches (growing together firſt into one trunk.) For the Vertebral Arteries, ariſing from the laſt hole but one of the Skull, fall at firſt divided through the ſides of the oblong Marrow; then united in its baſis, they go into a ſingle chanel, which meeting with the hinder branches of the *Carotides* (as it is ſaid) it is joyned with them; and from that place of the joyning of them togethr, a noted branch aſcends on either ſide under the edge or rim of the Brain, which being dilated upon the ſhanks or ſtocks of the oblong Marrow, is cleft or divided into very many ſmall ſhoots like hairs, ſome of which aſcend to the Glandula's placed behind the Cerebel, but the reſt make the arterious part of the *Choroeidal* infoldings. The anterior branches of the *Carotides*, before they are united, ſend from themſelves on either ſide a noted branch, which creeping upwards like a bounding River, diſtinguiſhes either Hemiſphere of the Brain as it were into two Provinces; but after the aforeſaid branches are united, preſently departing again from one another, they are carried to the Prow of the Brain, and from thence bending back between its *Hemiſpheres*, they fall upon the callous body. All theſe Arteries, before and after their mutual joyning together, ſend forth ſhoots and little branches on every ſide, which do not only creep through and intimately bind about the utmoſt compaſs of its Sphere, but its *Penetralia*, and more inward receſſes, like the young branches of Vines. The ramifications or theſe ſorts of branchings, both of the *Carotides* and of the *Vertebrals*, are ſhewn in the firſt Table, as they are found in a Man, and as a Sheep in the ſecond Table.

Moreover, this thinner *Meninx* or *Pia Mater*, cloathing the whole Brain, and its parts, as it receives the *Arteries* aſcending (as hath been ſaid) from a four-fold Fountain, ſo it is ſtuffed throughout with Veins, ſent from four boſoms. Theſe Veſſels mutually meeting, are complicated together, and almoſt every where conſtitute by their branches derived from both, and meeting one the other, and variouſly contorted among themſelves, the net-like or retiform infoldings; which indeed are not only outwardly in the ſuperficies, but in the diſſection, where-ever you may ſeparate one part from another, without breaking it, theſe kind of infoldings of the Veſſels are to be found. Becauſe, if you behold this frame, taken out of the Skull, collecting together the tops of all the turnings and the *Interſtitia* in this Membrane, and covering them with the joynings of the Veſſels, it will make the whole compaſs or frame of the *Encephalon* appear like a curious quilted ball. But if you go on to caſt abroad this Sphere, and to ſeparate the cleaving parts, knit together, of this Membrane, one from another, you will ſoon find, that this *Meninx* covers the gapings of the crevices or turning chaps of the Brain, binds the *Interſtitia* of either moiety or Hemiſphere, draws together the hinder part of the Brain, otherwiſe being lax and hanging looſe, and compaſſing about every border of it, as it were with a Welt, knits it to the oblong Marrow: and what is the chief of all, the univerſal Cortical or ſhelly ſubſtance of the Brain (to wit, in which the animal Spirits are procreated) is covered over with this Membrane planted with moſt frequent infoldings of the Veſſels; notwithſtanding the interior ſuperficies of the Brain being ſtretched out, (which being called the Callous body, is altogether medullary and white) is not cloathed with this *Membrane:* but inſtead of it many foldings of veſſels, commonly called *Choroeides*, are hung and as it were freely flow within its complicature. The reaſon of which is, becauſe as this part, to wit, the callous body, is rather deſigned for the Circulation than for the generation of Spirits, therefore it admits not a more plentiful influx of blood: nevertheleſs, for as much as there

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is need of heat, whereby the Spirits may be there more eaſily circulated, the blood being moved, within the Veſſels hanging there through the empty ſpace, might afford heat as it were from a fire kindled within a Stove. But within all the other receſſes of the Brain, and beſides, within the folds or lappets of the Cerebel, yea, and the *Interſtitia* or gaps of both theſe, and of the oblong Marrow, this Meninx inſinuates it ſelf, and inſerts the diſtributions of the Veſſels. In truth, the protenſion or out-ſtretching of this Membrane ſeems therefore the more admirable, becauſe having no where a peculiar place of its origine, it not only binds about the Head or *Encephalon* with a common covering, but alſo cloaths all its parts with proper coverings, and knits together their tops and proceſſes. Yea, this *Meninx* ſeems to enjoy a manifold and divers original: for where-ever the gapings or *Interſtitia* of any parts or proceſſes happen, portions of this Membrane there ſpringing forth, cover them all, and gather them together, and reach to them the ramifications or branchings of the Veſſels. In a moiſter Brain this Meninx may be eaſily ſeparated, and ample and large portions of it pulled away with the fingers; which being drawn away, the inſertions of the Veſſels, into the ſubſtance of the Brain and its Appendix, every where clearly appear. Laſtly, by this means the brain being thus left naked, unclothed of its Membranes and Coverings, its make or fabrick, and the diſpoſition or order of all its parts are next ſubjected to Anatomical Inſpection.

That the Anatomy of the Brain, properly ſo called, might be rightly celebrated, I judge we ought not to proceed after the common way of Diſſection. But when as the ſubſtance of the whole Head, taken out of the Skull, ſtands in view, firſt let the hinder partition of the Brain, where it is knit to the Cerebel and oblong Marrow or Pith, the Membranes being every where cut or pulled off, be freed (as much as it may be) from its cleaving to the ſubjected parts; then it will eaſily appear, that the ſubſtance of the Brain is not united to thoſe bodies, but of it ſelf is altogether free and independent of them, unleſs where it is joyned towards the ſuperficies by the knitting of the Membranes. Alſo this keel or hinder part of the Brain being divided by this means from the neighbouring parts, if the fore-part be bent back, the ſhanks of the oblong Marrow will appear wholly naked, and diſtinct from the Brain and Cerebel (unleſs where they are in ſome places hung to it.) Moreover, when the partition of the Brain, being looſned from its cohetion, is lifted up, the three Ventricles, commonly ſo called, go into one empty ſpace or mere vacuity, reſulting from the complication of the Brain. Beſides, it may be obſerved, how the Brain before is only united to the oblong Marrow; and that in two places of its ſhanks, as it were the tops, it is fixed; which *Fornix* ſo called, or arched Vault, is as it were a ſtring or ligament, which ariſing before, where the Brain is hanging to it, is carried to its hinder border, to which it is united as it were with two ſtretched out arms, and ſo it holds together the whole frame of the brain, leſt it be rolled out into a plain, ſtill in a ſpherical figure, and firmly binds the ſame to the ſhanks of the oblong Marrow. From the knitting of the other parts of the humane brain divided and lifted upwards, whereby the vacuity reſulting from its infolding, and eſteemed for Ventricles, alſo whereby the *Fornix* or arched Vault and Shanks of the oblong Marrow, naked and diſtinct, may be beheld, is repreſented by figure in the fourth Table.

And truly, this Poſition or Aſpect of the Brain, to wit, when its hinder border or partition, being freed from its coheſion by the Membranes to the oblong Marrow, and elevated, is bent forward, expoſes to be ſeen by the eyes themſelves, its whole frame or ſubſtance, to wit, whatever it hath without or within, or before and behind, and alſo plainly detects what its habitude and reſpect is to the other parts. The chief things of theſe I ſhall add, and in the ſame order wherein they occurred to Inſpection.

The figure of the Brain, eſpecially in a man, ſhews ſomewhat globous or ſpherical: the outward ſuperficies is on all ſides noted with chinks turning and winding like to the rollings about of the Inteſtines: each breach or Involution, yea the whole circuit of it contains a twofold ſubſtance, *viz.* the Cortical or rindy, which is the outmoſt and of an Aſh-colour; and the medullary or marrowy, which lyes under it, and appears white. The Brain being as it were plowed with theſe kind of rollings about, like ſo many ridges and furrows, is cleft in the middle, and parted as it were into two Hemiſpheres; yet both the moities come together, and are as it were founded in one like white ſubſtance, which covers inwardly, and as it were in Chambers or Vaults, the whole bulk of the Brain. This is harder than any other portion of the brain, and as it is altogether medullary; it receives all the marrows of the circumvolutions within it ſelf, and is to them inſtead of a common baſis. In either Hemiſphere of the Brain, about the fore parts, this callous body or marrowy ſubſtance, becomes more firm and thick by far than in any other place; and there it is on both ſides faſtned to the tops of the oblong Marrow. From thoſe tops, as it were its beginning, this medullary ſubſtance, covering over or chambering or arching the Brain, is ſtretched out towards the hinder parts, and by degrees leſſens in its thickneſs: at length the outward border of this ſtretched out, is drawn together more narrowly, and more below, it is conjoyned by the knitting of the Membranes and Veſſels (as we but now mentioned) to the tail of the oblong Marrow. Beſides, for its more firm connexion, a medullary proceſs ariſes from the fore part of the callous body towards the tops of it, which ſtretching under the fiſſure or cleft of the brain, reaches to its border; to which it is united, as it were with arms bending on either ſide: which arms indeed embrace the tail of the oblong Marrow, and ſo more firmly knit to it that border of the Brain.

This medullary proceſs, commonly called the *Fornix*, under its riſe or beginning, hath two white and medullary roots, either of them alike going out from the callous body, which roots nigh the tops, where the brain is hung to them, meeting together, paſs into the *Fornix* or Vault it ſelf, as if it were a broad proceſs, which ſtretches under the chamber of the brain, like a beam. Under this twofold root of the *Fornix* is laid croſs-wiſe, of the ſame magnitude, a medullary trunk, by which, like a bridge, there is a certain paſſage and communication between two proceſſes of the form of a Lentil, and chamfer'd or furrowed bodies beaming or ſhining in them. Further, from the midſt of the ſuperficies of this *Fornix*, a thin and pellucid hedge or pale is erected, which is affixed to the chanel or furrow of the callous body, almoſt along its whole paſſage. And for this reaſon, whilſt the three-ſided *Fornix* ſtretched underneath a chamber, ariſing from the complication of the brain, it diſtinguiſhed its appearing cavity as it were into three partitions, and ſo cauſed, that in it three Ventricles were repreſented.

The interior receſſes of the Brain will lye yet more clearly open, if the border, being on every ſide ſeparated and lifted up, as much as may be, from its cohering with the oblong Marrow, be cut a little further through the ſubſtance at the ſides of the ſame Marrow, to which it is united, nigh the chamfer'd bodies, and alſo the *Fornix*, being cut nigh the roots, be bent back, together with the brain; for then the frame of the brain may be wholly lifted up, turned forward, and unfolded into a plain, ſo that the whole interior ſuperficies of the callous body being ſtretched out into a broad floor, may be ſeen and handled. Where, beſides the medullary, and its moſt white ſubſtance, may be obſerved many white parallel lines, which cut the partition of the Brain in right angles, as if they were certain tracts or footſteps, in which the animal Spirits travel from one Hemiſphere of the Brain to the other, and return back again.

After this manner, in very many perfect four-footed Beaſts, the frame or ſubſtance of the Brain was wont to be turned over, the Sphere being projected into a plain, and its interiour ſuperficies to be unfolded into breadth. Alſo this kind of Method of Diſſection may be uſed in a mans brain, where the ſame *Phænomena* wholly occur to Anatomical obſervation. The chief difference is, that the bulk of the brain of a man, for that it is very large, and alſo far thicker, and endued with more turnings and windings; therefore it cannot be ſo eaſily and throughly inverted, as that of a Calf or Sheep, and reduced into a broad plain: yet it may be ſo far expanded and lifted up near its border or partition, that all the interiour receſſes may appear in view. The third and Fourth Figures ſhew the image of an humane brain bent back; but in the ſeventh Table is ſhewn the aſpect or ſight of a Sheeps brain wholly unfolded, and as it were ſpread plain.

In the leſſer four footed Beaſts, as a Mouſe, an Hare, Coney, and ſome others, the ſuperficies of the Brain being wholly plain or even, wants the turnings and windings; however from the complication of the border, and the under-ſtretching of the *Fornix*, there reſults a cavity repreſenting Ventricles.

After that we have throughly viewed all things which belong to the Brain, in the order as we have ſaid, let either Hemiſphere, covered within with the callous body, by which it hangs, be divided and removed from the tops of the oblong Marrow: which indeed may be exactly done, by cutting it near to the ſides of the Lentiform prominencies, which are found in the vulgar diſſection of the Head, within the interior Ventricles: for thoſe prominencies are the tops or heights of the ſhanks of the oblong Marrow, to which the callous body is immediately fixed. When the brain is cut after this manner, that the prominencies, which are the tops of the ſhanks of the oblong Marrow, may be left naked, let them be cut long-ways through the midſt (to wit, in the medullary part, where they are conjoyned to the callous body) and their interior ſubſtance will appear through the whole chamfered or ſtreaked; *viz.* medullary ſtreaks or chamferings are ſeen to aſcend and deſcend forward and backward; that none may doubt, but that theſe chamferings or ſtreaks were made by Nature, as it were paſſages or chanels for the paſſage and return, or going to and fro of the Spirits out of the callous body into the oblong Marrow, and on the contrary. The Figure of the ſhanks of the oblong Marrow, divided from the Brain, with their tops, which are the chamfered bodies, is expreſſed in the eighth Table.

After theſe ſtriated or ſtreaked bodies, the ſhanks of the oblong Marrow being divided for a little ſpace, go forward, then being united, they meet together in the ſame ſtock, made up as it were of two ſtems. But the ſtock or trunk of the oblong Marrow in its whole tract, *viz.* before and after the coalition of its ſhanks, hath many Proceſſes, Appendices, Prominences, and Inſertions of Veſſels, ſome of which ariſe from one ſide, and others from the other ſide, and make it unequal, with various productions and protuberances; of which hereafter.

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Fig. I.a

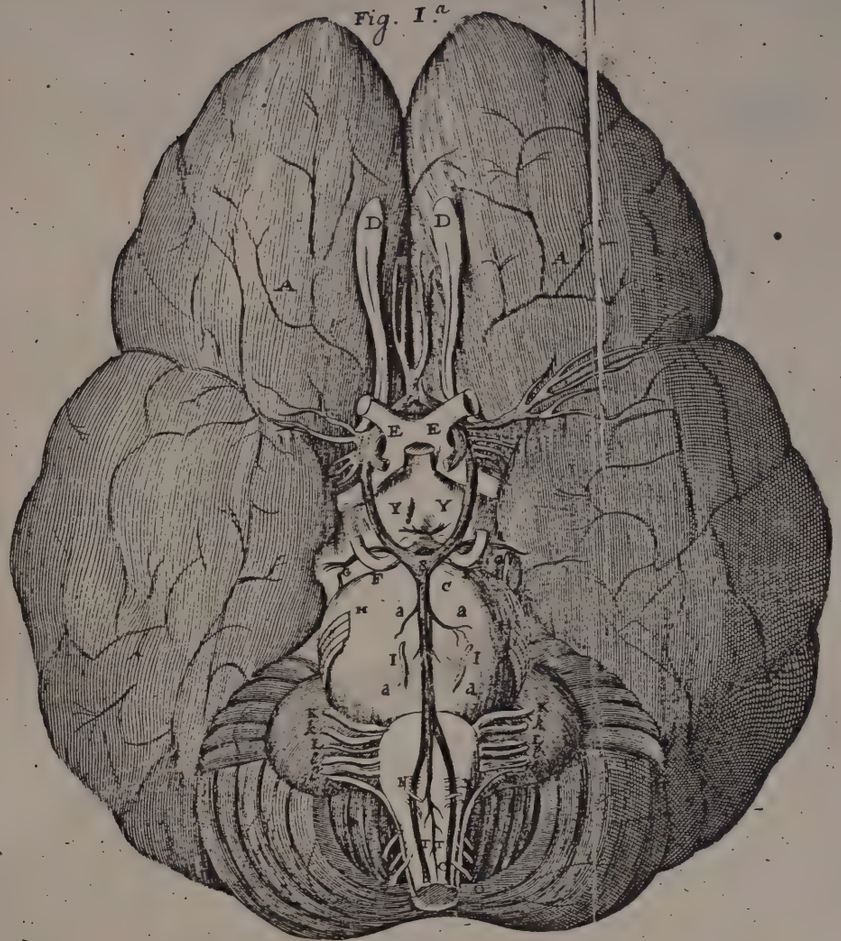
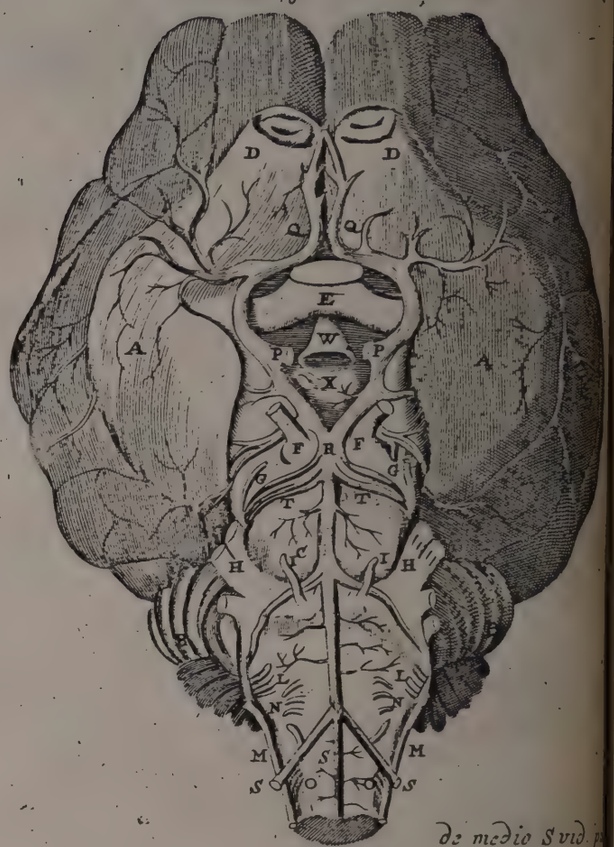


Fig. IId



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The First Figure.

Shews the Basis of an humane Brain taken out of the Skull, with the Roots of the Vessels cut off.

AAAA. *The anterior and posterior Lobes of the Brain quadripartite or divided into four parts.*

BB. *The Cerebel or little Brain in the hinder part of the Head.*

CC. *The long Marrow or Pith.*

DD. *The smelling Nerves or the first pair.*

EE. *The Optick or seeing Nerves the second pair.*

FF. *The moving Nerves of the Eyes the third pair.*

GG. *The pathetick Nerves of the Eyes, or the fourth pair.*

HH. *The fifth pair of Nerves.*

II. *The sixth pair of Nerves.*

KKKK. *The auditory or hearing Nerves, and their two processes on either side of them, the seventh pair.*

LLllll. *The wandring pair, or the eigth pair, consisting of many Fibres.*

MM. *The Spinal Nerves coming from afar to the origine of the wandring pair.*

NN. *The ninth pair consisting also of many Fibres, (which tending downwards, grow together into one Trunk) which arises a little above the process of the hinder part of the Head.*

OO. *The tenth pair tending downwards.*

PP. *The Trunk of the Carotidick Artery cut off where it is divided into the anterior and posterior Branch.*

QQ. *A Branch of it going in between two Lobes of the Brain.*

R. *The anterior Branches of the Carotides go away united, moving forward into the fissure or cleft of the Brain.*

S. *The posterior Branches of the Carotides united, and meeting with the Vertebral Trunk.*

TTT. *The Vertebral Arteries and their three Branches ascending.*

V. *The Branches of the Vertebrals growing together into one Trunk.*

WW. *The place designed where the Vertebrals and the Carotides are united, and either Branch ascends to the Choroidal infolding.*

X. *The Tunnel.*

YY. *Two Glandula's or Kernels placed behind the Tunnel.*

aaaa. *The annulary Protuberance, which being sent from the Cerebel, embraces the stock of the long Marrow.*

The Second Figure.

Shews the Basis of a Sheeps Brain taken out of the Skull, and the Roots of the Vessels cut off, where all the Arteries, by Ink being injected into one of the Carotides, are made black and more conspicuous.

AA. *Two Hemispheres of the Brain without Lobes, different from that in a Man.*

BB. *The lateral portions of the Cerebel.*

CCC. *The oblong Marrow.*

DD. *The olfactory or smelling Nerves cut off nigh to the mammillary Processes, that their Cavities may appear.*

E. *The Coalition or joyning together of the Optick Nerves.*

FF. *The motory Nerves of the Eyes, or the third pair.*

GG. *The Pathetick Nerves, or fourth pair.*

HH. *The fifth pair: the Trunk of which Nerve is presently divided into two Branches.*

II. *The sixth pair.*

KK. kk. *The seventh pair, or the hearing Nerves, on either side of which are two Processes.*

LL. *The eighth or wandring pair, the origine of which is made up of very many Fibres seeming to grow together.*

MM. *A Nerve coming out of the spinal Marrow to the beginning of the wandring pair.*

NN. *The ninth pair, consisting also of divers Fibres arising distinctly, which afterwards grow together into one Trunk.*

OO. *The tenth pair tending downwards.*

PP. *The Trunk of the Carotidick Artery cut off, where it is divided into the anterior and posterior Branch.*

QQ. *The inosculation of the anterior Branches.*

R. *The posterior Branches of the Carotides united, and meeting with the Vertebral Trunk.*

SSS. *The Vertebral Artery ascending with a triple Branch.*

TT. *Where the Carotides meet the Vertebral, and on either side many Arteries ascend to the Choroeidan infolding.*

V. *The coalition or joyning together of the Vertebral Branches into the same Trunk.*

W. *The Tunnel.*

X. *A white Glandula or Kernel placed behind it.*

CHAP.

CHAP. II.

The Parts of the oblong Marrow, and the reſt of the hinder Parts of the Head are recounted, and their Diſſection ſhewn.

HAving deſcribed both the Meninges, and the ramifications of the Veſſels in them, alſo the fabrick of the Brain, properly ſo called; and next ſhewed its outward partition gathered together into folds about the ſhanks of the oblong Marrow, and either middle or marrowy part of it hung to the chamfered bodies; we will now follow the remaining parts of the Head in order.

The chamfered or ſtreaked bodies, or the tops of the oblong Marrow, are two lentiform Prominences, which are beheld within the former Ventricles of the Brain, as they are commonly termed; the heads of theſe, which are more large and blunt, incline mutually one to another, and are almoſt contiguous. Out of the angle of this inclination the *Fornix* ariſes with a double root; to which is ſubjected or underlaid a certain tranſverſe medullary proceſs, and ſeems to knit together theſe ſtreaked bodies, as may be ſeen in the ſeventh Table GG. but the ends of thoſe bodies, being made ſharper, are reflected outward, and make as it were two ſides, with a ſharp triangle, to whoſe anterior ſuperficies the marrow of the callous body ſticks for a long tract; where, if theſe bodies be cut long-ways through the midſt, the medullary ſtreaks (as was already ſaid) will preſently appear. The figure and place of theſe, as alſo the medullary chamferings, are truly repreſented in the eighth Table.

Where the ſtreaked bodies end, the chambers or *Thalami*, as they are termed, of the Optick Nerves, poſſeſs the next part to the oblong marrow; to wit, in this place, its ſhanks riſe into unequal protuberances, out of the ridges of which the Optick Nerves ariſe, and from thence, being bent down in the fore-part with a certain compaſs, they joyn together about the baſe of the ſame marrow, and ſeem to be united; by and by being again parted, and going forward towards the ball of the Eye, they go out of the Skull. In this place the ſhanks of the oblong marrow in a Man are for the moſt part diſtinct, and gaping one from another, leave a deſcending opening, which is in the paſſage to the Tunnel; but in moſt four-footed Beaſts the ſhanks of the ſame medullary ſtocks are there diſtinct, only a little lower, and have a chink cut for the Tunnel: but the ridges of them, in which the beginnings of the Optick Nerves lye hid, are ſomewhat conjoyned, and for the ſpace of half an inch do grow together. Wherefore in Brutes there is one hole before this growing together, and another behind it, both which lead towards the Tunnel. The reaſon of this difference is, becauſe in a Man, for that the frame or Subſtance of the brain it ſelf is very large, and that its marrowy parts are remote one from another, it is behoveful for its ſhanks, whereby the tops of the oblong marrow may be the better fitted to the ſame, to be ſeparated, and from their mutual touching to be bent into a greater aperture. Hence it is obſerved, that in a Man the ſhanks of the oblong marrow, from the hanging on of the Brain, go forward with a greater angle of inclination, and with a certain bending compaſs; but in Brutes the ſame lye almoſt parallel. After what manner theſe parts are formed in an humane brain the third and fourth Figure ſhews; after what manner they are in four-footed Beaſts is ſhewn in the ſeventh Figure.

From the ſame ridges of the medullary ſhanks, from whence the Optick Nerves take their origines certain medullary proceſſes ariſing, and being dilated on either ſide above the brim of the ſecond hole, grow together about the root of the pineal *Glandula*. Theſe proceſſes (as it ſeems) are thoſe parts, which the Famous *Cartes* ſuppoſes to be Nerves belonging to the pineal *Glandula:* but I rather ſuſpect them to be productions only, by which the Optick Nerves may alſo communicate near their origines. Their figure is very well deſcribed in the ſeventh Table.

After the *Thalami* or Chambers of the Optick Nerves, other notable protuberances, commonly called *Nates* and *Teſtes*, the Buttocks and Teſticles (of the brain) grow to the ſuperior part of the medullary Trunk or ſtem, aud cover its ſuperficies about the ſpace of an inch; and for that they are not contiguous in the midſt, there is under them a certain hollowneſs in their whole tract. Theſe protuberances are leſſer in a Man, alſo in a Dog and Cat; laſtly, if we obſerved rightly, in other living Creatures, which are newly brought forth, that are impotent, and not inſtructed for the finding out of food. In a Calf, Sheep, Hog, and the like, they appear far greater: in Fiſhes and Fowls they are wholly wanting.

In number they are four, *viz.* two grow to either ſide of the oblong marrow. The former called *Nates* or the Buttocks, ſeem the greater and principal; to which the other latter called *Teſtes* or the Teſticles, hang as if growing out of them. As to their figure, they are round, and are commonly taken for two ſhanks on either ſide of the Brain and Cerebel planted near, which being bent inwardly, and turned back one towards the other, are ſaid to grow together, and ſo to conſtitute the oblong marrow. But this opinion, as we ſhall ſhew more largely hereafter, by the diſſection ordered according to our Method,

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is clearly falſe. For it plainly appears, that the Brain is fixed, long before theſe bodies, to the oblong marrow; nor is there any commerce between theſe and that, unleſs very remote.

But if the ſite of theſe parts, and their reſpects and habitudes to the neighbouring bodies, be well noted, it will appear plainly, that they make as it were a certain peculiar Region wholly diſtinct from the Brain and Cerebel, alſo from the oblong marrow it ſelf. Their ſituation is remote enough from the fore-parts, and ſufficiently ſeparated by the Cavity or Ventricle under-lying from the medullary ſtock or ſtem: yea a proper way, or one proceſs, ſeems to lead from the long marrow into theſe prominences, and another to go from them, and thence to be carried into the Cerebel. From hence we may ſuſpect, that theſe prominences (eſpecially the Native-form, or of the ſhape of a Buttock, which are the chief) are certain places of diverſion, in which the animal Spirits go apart in their paſſage from the oblong marrow into the Cerebel, and from this to that on the other ſide, and there ſtay for ſome animal uſes, of which we ſhall ſpeak hereafter. As to the way, which leads from the oblong marrow into theſe prominences; it is manifeſt, that beneath the origines of the Optick Nerves on either ſide a medullary Proceſs deſcends, with little Villages proper for it ſelf, which terminates in the aforeſaid prominencies. Then, if from theſe, you look for a paſſage out, it is equally clear, that from the hindermoſt prominencies, which are called *Teſtes*, on either ſide, a medullary proceſs doth obliquely aſcend, which being dilated into the Cerebel, is divaricated through its whole frame. But that the Natiform or Buttock-formed Prominences are Principals, and the *Teſtes* their dependences, or the heads of medullary Proceſſes, which are carried from thence into the Cerebel, manifeſtly appears in a Sheep, Calf or Horſe, and in ſome others, where the *Nates* are of a noted magnitude, the *Teſtes* of a very ſmall bulk grow to them, and in the middle between theſe the medullary Proceſſes, the Appendices of the former Prominences, exiſt. The aforeſaid Prominences, as alſo the medullary Proceſſes, which lead forward and backward, to and from them, are aptly repreſented in the fourth Table, but yet more clearly in the eighth Table TT. PP.

Further, becauſe the Animal Spirits reſiding in either Promptuary and Appendix, before they are carried to the Brain, ought to be confounded and mingled together, therefore the two prominences of either ſide do mutually grow together as it were with wings ſtretched out one to another; but for as much as it is behoveful for thoſe growings together to be diſtinguiſhed from the oblong marrow, therfore an hollowneſs comes between, which is by ſome eſteemed the fourth Belly, and by others a paſſage to it. Theſe Prominences in a Man, Dog and Cat, and ſome other Animals (as was above mentioned) are very ſmall, and almoſt even; alſo they appear, as the other portion of the oblong marrow, of a white colour. In a Calf, Sheep, Horſe, and many other four-footed Beaſts, the former protuberances, commonly called *Nates* or Buttocks, are remarkably great, alſo outwardly they appear to be of a fleſh-colour, becauſe they are cloathed with the thin *Meninx* or *Pia Mater*, which contains in it ſelf very many Veins and Arteries; which if ſeparated, the interior ſubſtance of thoſe parts is of a wanniſh colour, and ſuch as is not in all the oblong marrow or pith beſides. But it plainly appears, as in Brutes, ſo in Man, the hinder or poſterior prominences are *Epiphyſes* or additions of the former, and that from theſe additions or dependences the medullary proceſſes aſcend obliquely into the Cerebel; near which, other proceſſes cutting thoſe, deſcend direct from the Cerebel, which ſeem not to be inſerted into the medullary Trunk, but going about it, do conſtitute the annulary or ringy protuberance. This annulary protuberance is greater in a Man than in any other Creature. Beſides, it is obſerved, that where-ever the ſuperior prominence of the Buttock-form is larger, this inferior annulary is very ſmall; and ſo on the contrary. Further, thoſe medullary proceſſes, aſcending towards the Cerebel, communicate mutually among themſelves by the other tranſverſe medullary proceſs; and out of this tranverſe proceſs, two ſmall little Nerves ariſe, the fourth pair of thoſe which we have recounted, and which are called by us Pathetical. Each of theſe, delineated in fit figures, the ſeventh Table ſhews clear enough.

Not far from the aforeſaid Prominences, to wit, between theſe and the Chink, which is called the *Anus* or Arſe-hole, the Pineal Glandula or Kernel is placed, This is put in a Valley, which lyes between the Natiform protuberances, and thoſe which are the Chambers or *Thalami* of the Optick Nerves; in which place that Glandula or Kernel is fixed, ſometimes by very many ſmall Fibres, and ſometimes by two noted medullary roots ſubjected to the part; and beſides it is included in a Membrane, which is a portion of the *Pia Mater*, as in a Cheſt; and as this Membrane is ſtuffed with very many Arteries and Veins, ſome ſmall Veſſels alſo enter into this Glandula.

Under the Prominences but now deſcribed, (as was above hinted) a narrow Cavity or Ventricle is ſtretched out with a long paſſage, which, although it obtains ſome egregious uſes, yet it ſelf ſeems to be only ſecondary, and as it were by chance; for that the proceſſes of either prominence ought to be conjoyned among themſelves, and to be diſtinguiſhed from the under-lying medullary Trunk. Two holes lye open into this Trunk, one of which is placed in the beginning, and the other in the end of it, and through the middle of its paſſage the down-bending aperture tends towards the Tunnel; ſo that the ſerous humor entring at either hole, may preſently ſlide away into the Tunnel. Moreover, into the ſame aperture of the Tunnel there lyes open another paſſage, to wit, through the firſt hole, which is placed near the roots of the *Fornix*; ſo that from every quarter of the Head the ſe-

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rosities might be carried into that sink; to wit, that through the first hole, from the infoldings or the anterior Ventricles of the Brain; through the second hole, the humors which are gathered about the orbicular prominences, do come away; and through the third hole, those which are laid up nigh the confines of the Cerebel, do find a passage. These several holes, with the distinct ways to the Tunnel, are plainly delineated in the seventh Table H. M. T.

Above the Pineal Kernel, as it were above the Button, the infolding of the Choroeides seems to be hung; now this infolding is made after this manner: out of either side of the oblong marrow, where the border of the Brain is knit to it, two Arteries arising from the posterior branches of the Carotides, where they are united to the Vertebrals, do directly ascend; which being presently divided, like many Rivers planted near together, are carried towards the pineal Glandula, and there seem to be terminated by a mutual meeting: and in that place, out of the fourth bosom, sent down upon the pineal Glandula, the veinous branches come out on both sides, which in like manner being divided into filaments or small threads, meet with the capillary or hairy Arteries, and are in many places inoculated into them, and variously complicated with them; and so these Vessels, being Net-like, much interwoven among themselves, and interserted with the Glandula's, do constitue the to be admired infoldings. These kind of infoldings of the Vessels, as it were with two out-stretched wings, are thrust out on either side upon the shanks of the oblong marrow, even to the streaked bodies; but yet they only lye upon their superficies, nor are they more firmly affixed either to the oblong marrow, or to the callous body by any insertions of the Vessels; so that the blood seems only to be brought to these places, and carried away without any afflux of it made into the subjected parts; for what uses shall be spoken of hereafter. The Choroidal infoldings, with the pineal Glaudula, are drawn out in the seventh Table. G. F. E.

And thus far concerning the appearances found above the oblong Marrow, between the streaked bodies and the Cerebel; which indeed are almost constantly after a like manner both in Man and four-footed Beasts, unless that they only differ in bigness. Within this space, in the Pedestal or Basis of the same Marrow, many things worth noting occur: For besides the ends of the cut off Vessels, which are above recited, the site and structure of the Infundible or Tunnel deserve consideration. For behind the coalition or joyning together of either Optick Nerve between the shanks of the oblong Marrow there gaping, is sent down a receptacle as it were tubulated or made like a Pipe, covered without with a thin Membrane arising from the *Pia Mater*, and defended within with a medullary substance. The orifice of this is placed higher, between the shanks of the oblong Marrow, and receives their bending aperture; from thence a short Tube or Pipe being sent down, is inserted to the pituitary Glandula or Kernel. We see this Tube in an Horses Brain greater than a Gooses Quill, also shining and full of clear water; that it is not to be doubted, but that by this way the serous humors slide away from the Brain to the pituitary Glandula: but how these humors are carried away from thence, shall be afterwards inquired into, because they are not carried into the Palate or Roof of the Mouth, as is commonly believed.

Nigh the lower border of the Tunnel, in a Man, underneath there are two whitish Glandula's, though in Brutes only one, but greater, is found. What is the proper use of this part shall be told hereafter: in the mean time, whether it be doubled or only one larger, it seems to be as it were instead of a bank to defend or preserve the thin Membrane of the Tunnel, left it should be broken or thrust out of its place: on the other side the growing together of the Optick Nerves serves instead of the same kind of defence.

What besides is contained in this space are only the shanks of the oblong Marrow it self, which proceed directly from the chambers of the Optick Nerves towards the hinder part of the Head in a straight passage; and when both grow together below the Tunnel, they are afterwards distinguished in their whole tract by a line drawn through the midst. These shanks of a mans Brain are far larger than in brute beasts: to wit, in that they seem to be made up of very many medullary cords or strings joyned together in one, as if in this common passage and high-way of the animal Spirits, they were so many distinct paths, which the Spirits enter into respectively, according to the various impulses of sense and local motion. Moreover, this space of the oblong Marrow therefore appears shorter and more broken in a man, because much of it is hid by the annulary protuberance, which is sent from the Cerebel, and is very big. The *Pia Mater*, all about covering the sides of this medullary Trunk, cloaths them with most thick infoldings of the Vessels; by which heat and the nervous juyce are carried, as a continual provision for the Spirits, taking a long journey. Thus much for the first Section, or anterior portion of the oblong Marrow: now our order carries us to the inspection of its hinder Region, to wit, where the Cerebel grows to it; and the Processes sent from this either compass about its Trunk, or are inserted into it; out of which also, the other Nerves produced within the Skull, take their beginnings. Concerning these we will speak in order.

CHAP.

CHAP. III.

A Deſcription of the Cerebel and it Proceſſes, alſo of the hinder Region of the oblong Marrow.

BElow the orbicular Prominences, the Cerebel follows to be inſpected. The figure of this, like the Brain, is ſomewhat globous, alſo it appears unequal, marked with certain turnings and windings about; the ridges and furrows of whoſe turnings about the *Pia Mater* ſtretches over, and reaches out the infoldings of the Veſſels to them all, and deeply inſerts them into all. However the Cerebel is diverſified or variegated with its turnings and rollings about, not as the Brain, after an uncertain manner; but its folds are diſpoſed in a certain orderly ſeries; for the exterior frame of it ſeems to conſiſt of thin lappets, or little rings or circles, being contiguous and infolded, alſo going about through the whole compaſs with a parallel ſite or ſituation.

Either Region of the Cerebel, to wit, the former and the hinder, is terminated in a proceſs in form of a Worm. According to theſe ends, as it were in a double Pole, theſe Circles are very ſhort; thence aſcending towards the top or Equator, they are by degrees enlarged, as it were Parallels in a Sphere or Globe. Theſe Circles are outwardly Cortical or barky, and within medullary, and all their marrowy parts paſs into two ample middles; which indeed ſeem to be the ſame in the Cerebel, as the callous body in the Brain.

The Cerebel in ſome Animals conſiſts of one frame, and all its little circles are placed in the ſame parallel ſite, and keep the ſame proportion among themſelves; but in others there grow to the Cerebel as it were the primary Sphere, and endued with greater circles, ſome other bodies as it were Wens or Extuberances, or additional Spheres marked with leſſer circles. Theſe being eccentrick to the Cerebel it ſelf, have oftentimes labels or folds ordered in a diverſe ſeries from it.

But the Cerebel it ſelf (whether it hath theſe little Excreſcences growing to it or not) is found almoſt in all Animals of the ſame figure and proportion, alſo made up of the ſame kind of labels or lappets. Thoſe which have the Brain diverſly framed from a Mans, as Fowl and Fiſhes, alſo among four-legged Creatures, Conies and Mice, whoſe Brains want turnings about or convolutions, have the like ſpecies and the like diſpoſition of the folds and compoſure of the other parts of the Cerebel. The reaſon of this difference in the brain, and of the conformity in the Cerebel, is rendred hereafter, when we treat of the Uſe of the Parts.

As the Brain, within its Cavity, hath the Choroidal infolding made up of Arteries and Veins variouſly complicated, and of Glandula's thickly interſerted; ſo alſo the Cerebel hath got the like infoldings of Veſſels, and thoſe marked with very many Glandula's, and greater than thoſe in the Choroidal infolding. Theſe infoldings and heap of Kernels, the *Pia Mater* being ſeparated, which clothes the hinder part of the Cerebel, eaſily appear in ſight; for in that place theſe creep upwards on eithe ſide nigh the Worm-ſhaped proceſs, as it were with two branches; and receive the Artery on either ſide, from the Vertebral Artery, lying under the Baſis of the oblong Marrow and the veinous paſſages, ſent from either lateral boſom. We ſhall inquire hereafter into the uſe of this Infolding and of its Glandula's.

In the mean time, that we may deſcribe the ſite and hanging on of the Cerebel; the ſame ſtanding on the oblong Marrow ſeems to be fixed to its ſides, as it were by two little feet; between which, planted on either ſide, and the Cerebel placed above, and the trunk of the long marrow below, (becauſe all theſe ſhould be diſtinct one from the other) there comes a cavity or hollowneſs between, which is commonly called the four Bellies.

In either little foot, ſuſtaining the Brain, are found three diſtinct medullary Proceſſes. The firſt of theſe, ſent from the orbicular Protuberances, aſcends obliquely; the ſecond deſcending ſtraight from the Cerebel, and paſſing through the other acroſs, compaſſes about the oblong Marrow; the third proceſs, deſcending from the hinder Region of the Cerebel, is inſerted into the oblong Marrow, and increaſes its trunk as it were with an additional cord or ſtring. Theſe ſeveral Proceſſes are truly repreſented in the ſeventh Table. Q. P. R.

But as to what belongs to the annular or ringy Protuberance, by which the medullary Trunk, both in Man, and in ſome four-footed Beaſts, is compaſſed about, that is made after this manner. The ſecond or middle proceſs of the Cerebel, deſcending ſtraight to the oblong marrow, ſeems not to be implanted in it, as ſoon as it touches its ſides, but growing into a larger bulk, goes about the ſuperficies of the ſame Marrow with divers circular Fibres. And ſo when in either ſide both thoſe kind of proceſſes of the Cerebel, being dilated or carried from the top of the medullary Trunk towards its Baſis, do mutually meet, they make that circular protuberance. The ſubſtance of this is far larger in a Man than in any other Animal, in an Hare, Rabbet, Mouſe, and the like, it is very ſmall; in Fowl it is either wholly wanting, or for its ſmallneſs ſcarce to be diſcerned by the eyes. Concerning its bulk, this is a conſtant obſervation. They who have the orbicular prominences before the Cerebel ſmall, have this annulary protuberance very big; and on the contrary, they who have thoſe prominences big or very great, have this ring very ſmall: further, they who wholly want the Buttock-form protuberances, as in Fowl, ſeem alſo to want this annulary.

In many brute Animals, but not in Man, nigh to this greater Protuberance, a little lower, another leſſer, in like manner orbicular, ſtands, and compaſſeth about the ſuperficies of the oblong Marrow; the root of which is a white and medullary line, ſtretched out under the Cerebel, above the botom of the fourth Ventricle. From the ſides of this leſſer protuberance the auditory Nerves ariſe: In Man the auditory or hearing Nerves are ſeen to ariſe out of the utmoſt brim of the greater protuberance, in like manner they have for their root a white medullary line covering the fourth Ventricle.

That this line, and the three diſtinct medullary Proceſſes, which conſtitute either little foot of the Cerebel, may be more plainly ſhewn, alſo that the moſt inward frame of the Cerebel may be viewed, its whole Globe ought to be cut through both Poles, *viz.* in the middle through the Vermiform or Worm-ſhaped proceſſes; then it will plainly appear, that in either Hemiſphere there is an ample middle or marrow, wherein the marrowy branches, being ſtretched abroad on every ſide, like thoſe of a tree, ſpread through the Cortical ſubſtance of the Cerebel, every where diffuſed; and that in either middle or marrowy part, the three diſtinct proceſſes, which make either trunk, or little foot of the Cerebel, are inſerted. Each of theſe, are fitly repreſented in the ſeventh Table.

Thus much for the Cerebel, and by what means it is faſtned to the oblong marrow. Beſide theſe it is to be obſerved, that about the bottom of the Baſis of the oblong marrow, out of the greater Ring, come out two medullary ſtrings, which being diſtinct from the reſt of the medullary Trunk, go right forward towards the ſpinal marrow, and in its progreſs, being made ſtraiter by degrees, like Pyramids, after about the ſpace of an inch, end in ſharp points. The extremities of theſe conſiſt on the other ſide, where the wandring pair of Nerves have their original, and make a certain riſing up in the oblong Marrow. Hence it is likely, that theſe ſtrings are paſſages or chanels of the animal Spirits, wherein they are carried from the greater Ring, or what is the ſame thing, from the Cerebel into the wandring pair, and the beginnings of other Nerves implanted near; for what end, ſhall be ſaid hereafter. Theſe pyramidal Bodies do not ſo manifeſtly appear ſo long as the *Pia Mater* clothes them, and hides them with the infoldings of the Veſſels; but this Membrane being pulled away, they are ſo conſpicuous, eſpecially in a Man and a Dog, that they ſeem like greater Nerves. In thoſe Animals, where the annulary Protuberance is greater, theſe proceſſes being brought from the ſame in right angles, are greater and more conſpicuous; and on the contrary, in Fowl they are clearly wanting.

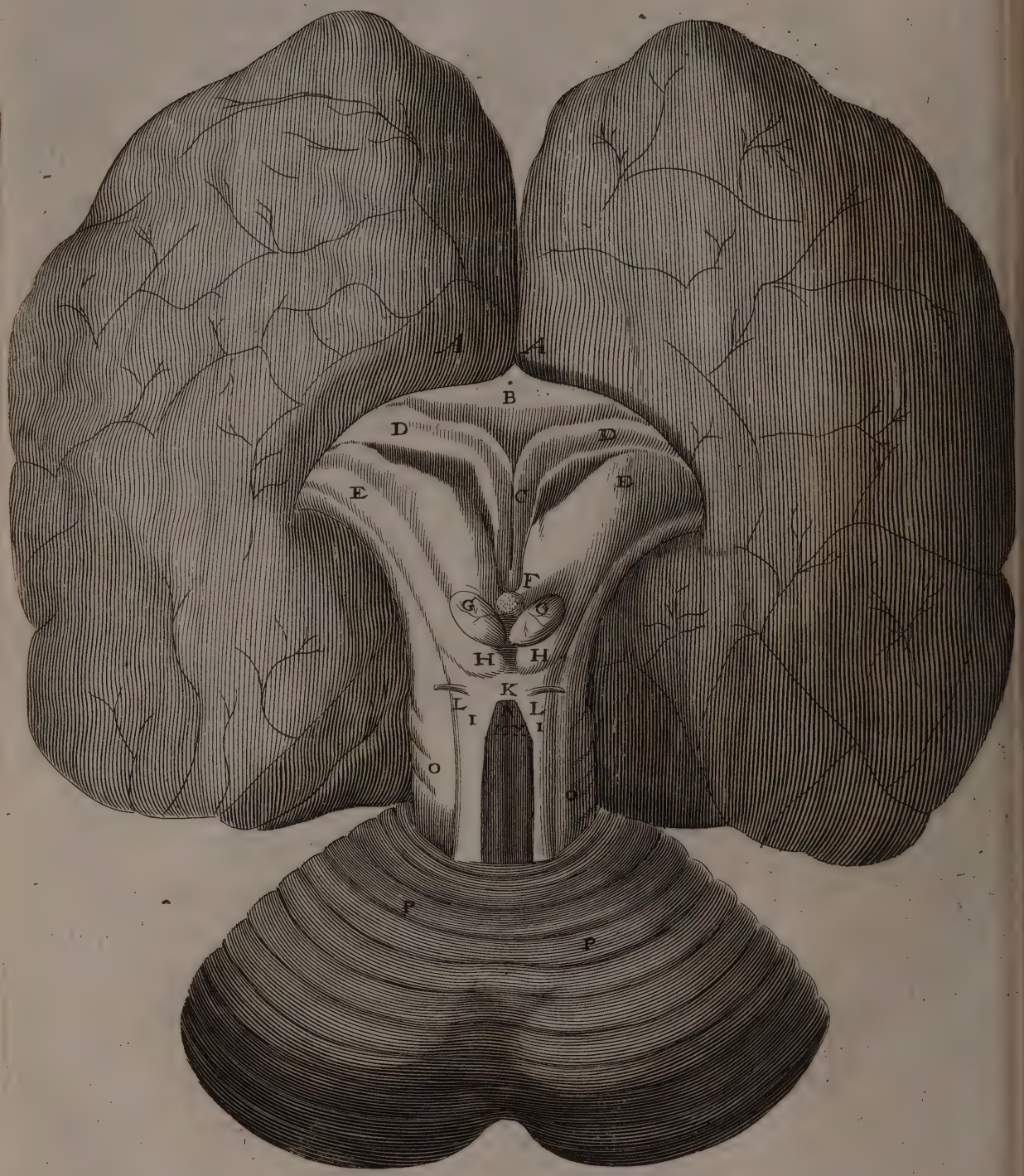
Concerning this hinder Region of the Head, there is not much beſides worth noting, except the productions of the Veſſels. But there are Veſſels which chiefly belong to theſe parts, the latter ſix pair of Nerves ariſing within the Skull and the Vertebral Arteries. We have already deſcribed in ſome meaſure the beginnings of the former; what belongs to the more full knowledge of them, we ſhall leave to be handled in its proper place. As to the Vertebral Arteries, they reach from about the fartheſt end of the oblong Marrow, now about to end in the ſpinal, to its ſides. Theſe Veſſels, as they are ſmaller, ſo they enter the Skull with leſſer proviſion than the Carotides; for they are neither flouriſhed firſt with Net-like infoldings, nor are carried in a long journey by compaſſing about; but either Artery, paſſing directly through the Cuniform or Wedge-like Bone, embraces the medullary Trunk on either ſide. Although theſe go forward divided for a little ſpace, yet afterwards they are united, and with a ſingle channel or paſſage, they meet with the poſterior Carotides inclining mutually one towards the other; and ſo all the branches, meeting as it were in a threefold way, are inoculated one in another. The Vertebral Arteries, firſt ſhewing themſelves within the Skull, are diſpoſed otherwiſe in Brutes than in men: in the latter they fall through the ſides of the oblong marrow parallel for ſome ſpace, then as it were with a certain ſemicircular compaſs, they mutually incline one towards the other, and preſently meet. The branches which firſt go forwards divided, are ſometimes only two, to wit, one on either ſide, ſometimes three, and then beſides the two former, another is produced in the middle. But in Brutes, either Trunk of the Vertebral Artery, at the firſt coming to the Marrow, inclines preſently to the meeting of the other with an acute angle, and quickly both meet together. The *Vertebrals*, even as the *Carotides*, ſend forth manifold branches in their progreſs with an innumerable ſeries of ſhoots, which cover over the oblong marrow, the Cerebel, and all their cavities and receſſes, and water them all with a plentiful flood of blood.

Theſe are the *Phænomena* or Appearances which the whole frame of the Brain and its Appendix is wont to exhibit to Anatomical Inſpection, and which, as to its fabrick, and all its parts, and proceſſes, are to be found both within and without. As it is a hard and troubleſome buſineſs to inquire into the actions and uſe of each of theſe, ſo it is alſo joyned with ſo much pleaſure and profit, that I dare promiſe to my ſelf and others, that it will be a thing worth our labour and while. Yet before we enter upon this, there remain to be unfolded ſome things hid in ſome of the bones of the Skull, ſuch as are the pituitary Kernels, the admirable Net, and ſome others; alſo we ought to ſhew firſt, briefly at leaſt, a type or figure of the Brains in Fowl and Fiſhes.

CHAP.

cc. p. 57.

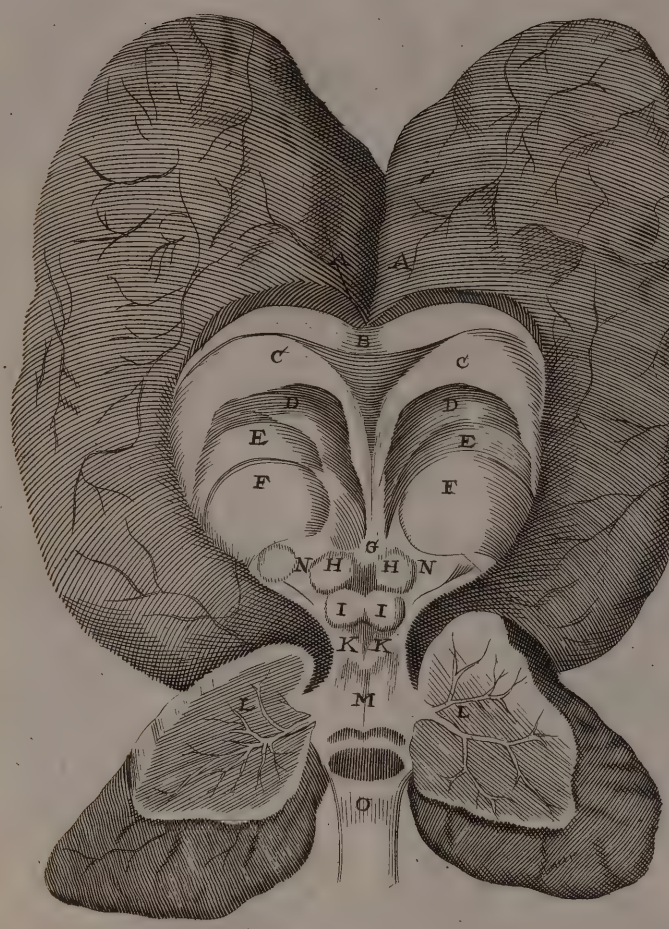
Fig. III



P. 57

DD. p. 57.

Fig. III.



The Third Figure.

SHews the outmoſt or ſuperiour Superficies of the humane Brain taken out of the Skull; where the border of the Brain being looſned from the knitting of the other Parts, made by the Membranes, is elevated and turned outward, that the ſhanks of the oblong Marrow, the Fornix *or arched Vault, the* Nates *and* Teſtes, *with the pineal Kernel, and other Proceſſes, may be clearly and diſtinctly beheld.*

AA. *The border of the Brain, which in its natural ſituation was contiguous to the Cerebel.*

B. *The brim or margent of the callous Body beſmearing either Hemiſphere of the Brain, which in its natural ſite leans upon the pineal Glandula.*

C. *The* Fornix *or arched Chamber.*

DD. *The Arms of it embracing the ſhanks of the oblong Marrow.*

EE. *The ſhanks of the oblong Marrow, out of which the Optick Nerves proceed, and the tops of which (ſituated further out of ſight) are the ſtreaked Bodies.*

F. *The pineal Glandula, between which and the root of the* Fornix, *ſtands the chink leading to the Tunnel.*

GG. *The orbicular Protuberances which are called* Nates *or the Buttocks.*

HH. *The leſſer Protuberances called* Teſtes *or the Teſticles, which are Excreſcencies of the former.*

II. *The medullary Proceſſes which aſcend obliquely from the* Teſtes *into the Cerebel, and conſtitute part of either of its* Meditullium *or marrowy part of it.*

K. *The meeting of thoſe Proceſſes through another tranſverſe or croſs Proceſs.*

LL. *The beginning of the pathetick Nerves out of the meeting of the aforeſaid Proceſſes.*

MM. *A portion of the oblong Marrow lying under the aforeſaid Proceſſes and Protuberances.*

N. *The hole of the Ventricle or Cavity which is placed under the orbicular Protuberances.*

OO. *A portion of the annulary Protuberance ſent from the Cerebel, and embracing the oblong Marrow.*

PP. *The outmoſt and upper ſuperficies of the Cerebel.*

The Fourth Figure.

The Effigies of an humane Brain of a certain Youth that was fooliſh from his birth, and of that ſort which are commonly termed Changelings; the bulk of whoſe Brain, as it was thinner and leſſer than is uſual, its border could be farther lifted up and turned back, that all the more interior parts might be more deeply beheld together.

AA. *The border of the Brain lifted up, and very much bent back, which in its natural ſite, being knit to the oblong Marrow, nigh the Cerebel, did hide the* Nates *and* Teſtes.

B. *The border or inferior margent of the callous Body.*

CC. *The* Fornix, *with its two Arms, embracing the ſhanks of the oblong Marrow.*

DD. *The internal cavity or hollowneſs of the Brain reſulting from the folding together of its border about the oblong Marrow.*

EE. *The tops of the ſhanks of the oblong Marrow, or the ſtreaked or chamfered Bodies.*

FF. *The Chambers of the Optick Nerves.*

G. *The pineal Kernel, between which and the root of the* Fornix *the hole is, whoſe paſſage leads both to the Tunnel, and to the Ventricle lying under the orbicular Protuberances.*

HH. *The Protuberances called* Nates.

II. *The Protuberances called* Teſtes.

KK. *The medullary Proceſſes ſtretching out from the* Teſtes *to the middle of the Cerebel.*

LL. *The laid aſide Hemiſpheres of the Cerebel cut in two through the midſt, that the Trunk of the oblong Marrow may be the better ſeen, where its medullary ſubſtance branches out into the form of a tree.*

M. *The Furrow below the medullary ſtock, which being covered by the Cerebel, makes the fourth Ventricle in the form of a writing pen.*

NN. *The medullary Proceſſes which ſeem to be paſſages out of the oblong Marrow into the orbicular Protuberances.*

O. *The end of the oblong Marrow giving place to the ſpinal.*

CHAP. IV.

The Parts and ſome of the Contents of the ſeparated Skull unfolded.

IT is not our intent, nor will it be needful for us to delineate the figures and ſituation of the ſeveral Bones of the Brain-pan, or to deſcribe their various holes, which tranſmit the Trunks of the Veſſels like the hanging weights of a Clock. All theſe are well enough known; ſo that to treat of theſe Gates or Entries is ſuperfluous. Beſides alſo, by what means the Nerves, ariſing within the Skull with their ramification or branching forth, enters the dens and caverns of the Bones, ſhall be delivered particularly afterwards. Wherefore for the preſent our buſineſs ſhall be only to take notice of ſome things, chiefly worth noting, concerning the ſanguiferous Veſſels paſſing through the Cuniform or Wedge-like Bone, not ſufficiently noted by others.

Among the various uſes and offices which the Cuniform or Wedge-like Bone yields to the Brain and its Appendix, it is not of the leaſt note or moment, that it tranſmits the Carotidick Arteries, not without a certain mechanical or artificial proviſion; and that in the middle way, by which they muſt paſs, it contains the pituitary Kernel, and ſometimes the wonderful Net. Each of theſe deſerve conſideration; the more, for that in divers Animals they are after a different manner; and becauſe it is much controverted among Phyſicians concerning their frame and uſe. But we will firſt ſpeak of the pituitary Glandula, becauſe this part, being placed higher, is obſervable to Anatomical Inſpection before others.

The pituitary Glandula or ſnotty Kernel is hid within a proper Cell or ſtall, made hollow in the middle of the Wedge-like Bone, being ſhut up in the Cheſt ſometimes more ſtrictly, ſometimes more looſly: For in a Dog, Cat, and ſome other Creatures, ſticking to the Tunnel, it is pulled away together with it when it is removed; and then its bulk conſiſts of two Glandula's or Kernels diſtinct among themſelves, and eaſily to be ſeparated one from another. But in a Calf, Sheep, Hog, and many others, it is ſtrictly included on every ſide, except where it admits the Tunnel, and clothed with the hard *Meninx* or *dura Mater*, and with its coverings ſhut up between the cavity of the Bone. Beſides, in theſe, its frame or ſubſtance ſeems but one and undivided, though, in truth, it is made up of a ſubſtance which is of a twofold nature or kind.

This Glandula is found in all perfect Creatures; for Man, all four-footed Beaſts, yea Fowl or Fiſhes are provided or endued with it: from whence we may conclude it to have ſome neceſſary uſes in the Brain. But as to its quantity or bigneſs, its proportion is various in divers Animals, according to the bigneſs of the head and body wherein it is; becauſe in a Lamb it is greater than in a Man or Dog; alſo its bulk in a Horſe is leſſer than in an Ox. But the reaſon of this difference ſeems to conſiſt in this chiefly, for that the pituitary Glandula in ſome, reſpects the bulk of the brain only laid upon it, and in others both the brain and the Carotidick Arteries aſcending near it; and ſo as it hath a reſpect to both theſe together, or only to one, its ſubſtance or bulk is either greater or leſſer. For truly in ſome Animals the Carotidick Arteries being dilated within the Skull, are preſently divaricated into Net-like infoldings, and from thoſe infoldings many ſhoots of the Veſſels every where enter this Glandula, and are interwoven into its ſubſtance. Further, becauſe this infolding of the Veſſels, called the wonderful Net, is found very large in ſome, and in others very ſmall; therefore this Kernel, for as much as it admits from theſe, few branches, and from thoſe far more, and in ſome other Animals ſcarce any ſhoots from the Arteries, anſwers to this divers diſtribution of the Veſſels, with the various proportion of its bulk. Becauſe it is obſerved in ſome Animals, as chiefly in a Man and a Horſe, that this wonderful Net is wholly wanting; and whereas in ſuch, either Artery is carried about by a long compaſs between the receſſes of this bone; from its trunk in a man ſometimes one or two ſhoots, ſometimes none, are carried into the pituitary Kernel; alſo in an Horſe fewer branches enter into it, and ſo its bulk in theſe becomes leſſer.

But in very many other Animals (eſpecially thoſe who have the wonderful Net) it may be proved, beſides ocular inſpection, alſo by this Experiment, that many ſanguiferous Veſſels enter this Glandula; for if an inky liquor be ſquirted into the Carotides with a Syringe, the exterior part of the Glandula, that is interwoven with the blood-carrying Veſſels, will be very much dyed with a black colour. Wherefore without doubt, it may be thought, that this Glandula doth receive into it ſelf the humors, to wit, flowing into it from the Tunnel in all kind of living Creatures, and in ſome from the branches of the Carotides. Yet by which way theſe humors are carried away again, doth not ſo plainly appear; for we affirm, with the moſt Learned *Schneider*, that they do not at all fall down into the Palate through the holes of the under-lying bone. Yet in the mean time, we ſuppoſe thoſe holes to be only made to procure lightneſs to the bone; becauſe in thoſe Animals, which have the greater pituitary Kernel, thoſe holes in the bone are more and larger: further, I have often found Veſſels or Chanels to be contained between thoſe holes; and when I had injected Ink within the

the great hole of the ſame bone in a Calf, the black liquor preſently entred the leſſer Veſſels ſubject to the bone, and at laſt the Jugular Vein. And by this Experiment chiefly we conjecture concerning the office and duty of this Glandula; of which we ſhall ſpeak more fully hereafter, when we inquire into the uſe of this and the Tunnel.

Nigh to either ſide of the pituitary Kernel, if the *dura Mater* be opened, the Carotidick Artery lyes ſtretched out upon the wedge-like bone, about the length of an inch: for as this Artery riſes up below the Turky-Chair, ſometimes higher, ſometimes farther within the Skull; the ſame being preſently bent in from its firſt aſcent, goes in under the *dura Mater* till it comes to the anterior border of the ſame Chair; where again being intorted, and being ſent forth upwards with a certain compaſs, it perforates the hard *Meninx*, and is carried ſtraight towards the Brain. So this Veſſel with its double aſcent and crookedneſs (to wit, above the Baſis of the Skull, and then above the hard Meninx, together with its ſituation, ſtretcht out in length under the ſame) repreſents in moſt the letter S inverſed; but in a man (as ſhall hereafter be more largely ſhewn) its ſite, by reaſon of the longer tract of the Veſſel and its greater curvature, repreſents the ſame letter double after this manner S S.

The Carotidick Artery in all Animals aſcends obliquely within the Skull, but as to its ſite or protenſion nigh the pituitary Glandula, it is not after the ſame manner in all: for in a Man paſſing through the Canal-bone, peculiarly ingraven by it, with a ſingle Trunk, it lyes every where ſtretched out at length; and out of this Trunk it ſends forth ſometimes, though not always, ſome ſhoots to the pituitary Glandula. Alſo in a Horſe, its Trunk is ſingle; but where it firſt ariſes within the Skull, either Carotides, through the croſs branches ſent from one ſide to the other, before they perforate the *dura Mater*, communicate among themſelves. And as in moſt other living Creatures, the Artery, however before branched forth, yet being made one ſingle Trunk, goes into the Brain; in a Horſe either Carotick Artery being parted in two, ſends forth upwards two branches, ariſing from the *dura Mater*, in two diſtinct places.

In a Dog, Fox, Sheep, Calf, Stag, and many other four-footed Beaſts, either of the Carotides, whilſt hid within the Skull under the *dura Mater*, being divided into ſmall ſhoots, and complicated with other Veſſels, to wit, both Veins and nervous Fibres, conſtitutes the Net-like infoldings; which infoldings, being ſtretched out on either ſide of the Turky Chair, fill the cavity there exiſting; then after manifold divarications of all the Veſſels, ſome arterious ſhoots being diſintangled from the others, and again united, grow together into one Trunk, which boring thorow the *dura Mater*, paſſes ſtraight into the Brain.

The aforeſaid infolding is, commonly called the wonderful Net, and that deſervedly, for there is nothing in the whole fabrick of the animal Body more worthy of admiration; in which, beſides the arterious little branches which proceed from either of the aſcending Carotides, the veinous ſhoots, though fewer, meet with thoſe deſcending from the inward Jugular branches; and both kinds of Veſſels being divided into ſmall ſhoots, like a bundle of twiſted ſilk, are variouſly folded together; which complications of the Veſſels however are ſuſtained by the nervous Fibres, ſupplied from the greater Trunk of the fifth pair of Nerves. The aforeſaid infolding of the Veſſels or wonderful Net in ſome Animals is far greater, and contains much more divarications of the Veſſels than it hath in others; for in a Calf, Sheep, Goat, which are fed with graſs, its frame is larger than in a Dog, Cat, and other fleſh-eating and hotter Brutes. Further, it is obſervable, where the wonderful Net is greater, that the infolding of one ſide is ingraſted into the infolding of the other oppoſite ſide, and that from both, many more ſhoots of the Veſſels do enter into the pituitary Kernel; ſo indeed, that if you ſhall inject Ink into the Trunk of the Artery below the Skull, the Veſſels on either ſide, or the infoldings, will be dyed with the ſame tincture, and the black liquor will flow out of the Trunk of the oppoſite Artery.

In truth we have often ſeen this kind of Experiment repeated. Let the Carotidick Arteries be laid bare on either ſide of the *Cervix*, or the hinder part of the Head, ſo that their little Tubes or Pipes, about half an inch long, may be exhibited together to the ſight; then let a dyed liquor, and contained in a large Squirt or Pipe, be injected upwards in the trunk of one ſide, after once or twice injecting, you ſhall ſee the tincture or dyed liquor to deſcend from the other ſide by the trunk of the oppoſite Artery: yea, if the ſame be more copiouſly injected towards the Head, from thence returning through the Artery of the oppoſite ſide, it will go thorow below the *Præcordia*, even to the lower Region of the Body; when in the mean time, little or nothing of the ſame tincture is carried thorow the outward and greater Jugular Veins. Then the Head being opened, all the Arteries, before the entrance of the Head, and the Veins of the ſame band with them, will be imbued with the colour of the ſame injected liquor. Further, in the Veſſels which conſtitute the wonderful Net, and which cover the Baſis of the Brain, ſome footſteps of the ſame tincture will appear. But that this liquor doth deſcend ſo plentifully by the oppoſite Artery, and not by the Jugular Vein, either aſſociate or oppoſite, the reaſon is, becauſe it cannot enter thoſe Veins, unleſs the region of the whole Brain, being firſt paſſed thorow, it had entred the boſom; but the liquor being plentifully injected, could not ſo ſuddenly paſs through the very ſmall Veſſels covering the Brain: wherefore rather than the force ſhould be carried to the Brain by the violent impulſe of the liquor, it returning from the injection, and otherwiſe threatning a flood to the Brain, finds the way

way of receding alſo by the oppoſite Arteries, for that end, both before they enter the Brain, and after they have entred it, communicating among themſelves. And here we cannot ſufficiently admire ſo provident (and to be equalled by no mechanical Art) a diſpenſation of the blood within the confines of the Brain. For in as much as the Carotidick Arteries do communicate between themſelves in various places, and are mutually ingrafted; from thence a double benefit reſults, though of a contrary effect: becauſe by this one and the ſame means care is taken, both leſt the brain ſhould be defrauded of its due watring of the blood, and alſo leſt it ſhould be overwhelmed by the too impetuous flowing of the ſwelling ſtream or torrent. As to the firſt, leſt that ſhould happen, one of the *Carotides* perhaps being obſtructed, the other might ſupply the proviſion of both; then, leſt the blood ruſhing with too full a torrent, ſhould drown the chanels and little Ponds of the brain, the flood is chaſtiſed or hindred by an oppoſite Emiſſary, as it were a Flood-gate, and ſo is commanded to return its flood, and haſte backward by the ſame ways, and to run back with an ebbing Tide.

By this kind of proviſion the Arteries about to enter the Brain are provided: yea, and the paſſages of the Veins, deſtinated for the returning of the blood from thence, ſeem alſo to be diſpoſed with a wonderful artifice. For when the anterior boſoms transfer their load into the two Laterals, which are the poſterior, and they themſelves end in the Jugular Veins, it is obſerved, that thoſe latter boſoms have furrows or cavities inſculped whereby they may ſettle or reſt upon the hinder part of the Head; and when as either boſom, through a proper hole, being about to go into the Jugular Vein, ſlides out of the Skull; nigh that hole, in the outward part of the Skull, a round and ample den is made hollow, and covered over by the extremity on either ſide of the ſame boſom, inlarged into a greater capacity, to the end, that the blood, whilſt it ſlides forth out of the Head with a full torrent, ſhould not ruſh into the Veins with too rapid and vertiginous an influx, and ſo make a forcible entry on the Heart it ſelf, therefore it hath here a diverſion large enough, in which eſtuating or boiling up, till a more free and open ſpace may be granted to its courſe, it may be ſtaid without any trouble. Certainly there can be nothing more artificial thought upon, and that can better argue the Providence of the great Creator, than this fit or convenient diſpoſition of the blood in the brain, and without it, and the way of its reciprocation in divers Animals, accommodated to the neceſſity of every one. And laſtly, in the diſſection of Beaſts, other miracles of the ſame nature happen, whereby ſhewing the Finger and Divine Workmanſhip of the Deity, a moſt ſtrong and invincible Argument may be oppoſed to the moſt perverſe Atheiſt.

The Fifth Figure.

SHews the interior Baſis of an humane Skull; where is ſhewn after what manner the Veſſels of every kind cut off from the Brain, and about to go out of the Skull, are hid or laid up under the dura Mater.

A. *The hollowneſs of the Bone of the Forehead.*

B. *The cloſe or mound of the Cribriform or Sieve-like Bone.*

CC. *The mammillary Proceſſes, which are much thinner, and endued with a leſs open cavity, than in four-footed Beaſts, endued with a more excellent ſenſe of ſmelling.*

DD. *The Optick Nerves, being far ſeparated, go out of the Skull otherwiſe than in moſt brute Beaſts.*

E. *The pituitary Glandula or Kernel with the top of the Tunnel inſerted into it.*

FF. *The Carotidick Arteries ſhewing themſelves nigh its ſides.*

GG. *The moving Nerves of the Eyes going out of the Skull.*

HH. *The pathetick Nerves, hid under the* dura Mater, *go out from the Skull at the ſame hole with the former.*

II. *The fifth pair of Nerves hid under the* dura Mater.

KK. *The ſixth pair ſtretched forth under the* dura Mater, *and go out alſo at the ſame hole with the third and fourth pair.*

LL. *The ſeventh pair entring with a double Proceſs the ſtony Bone.*

MM. *The eighth or the wandring pair ſeen to grow together with an acceſſory Nerve of many Fibres,* NN. *as it goes out of the Skull.*

NN. *The acceſſory Nerve to the wandring pair.*

OO. *The ninth pair.*

PP. *The tenth pair tending downwards, hid under the* dura Mater, *where the Vertebral Artery aſcends.*

QQ. *The lateral or Side-boſom.*

The

Fig. V.

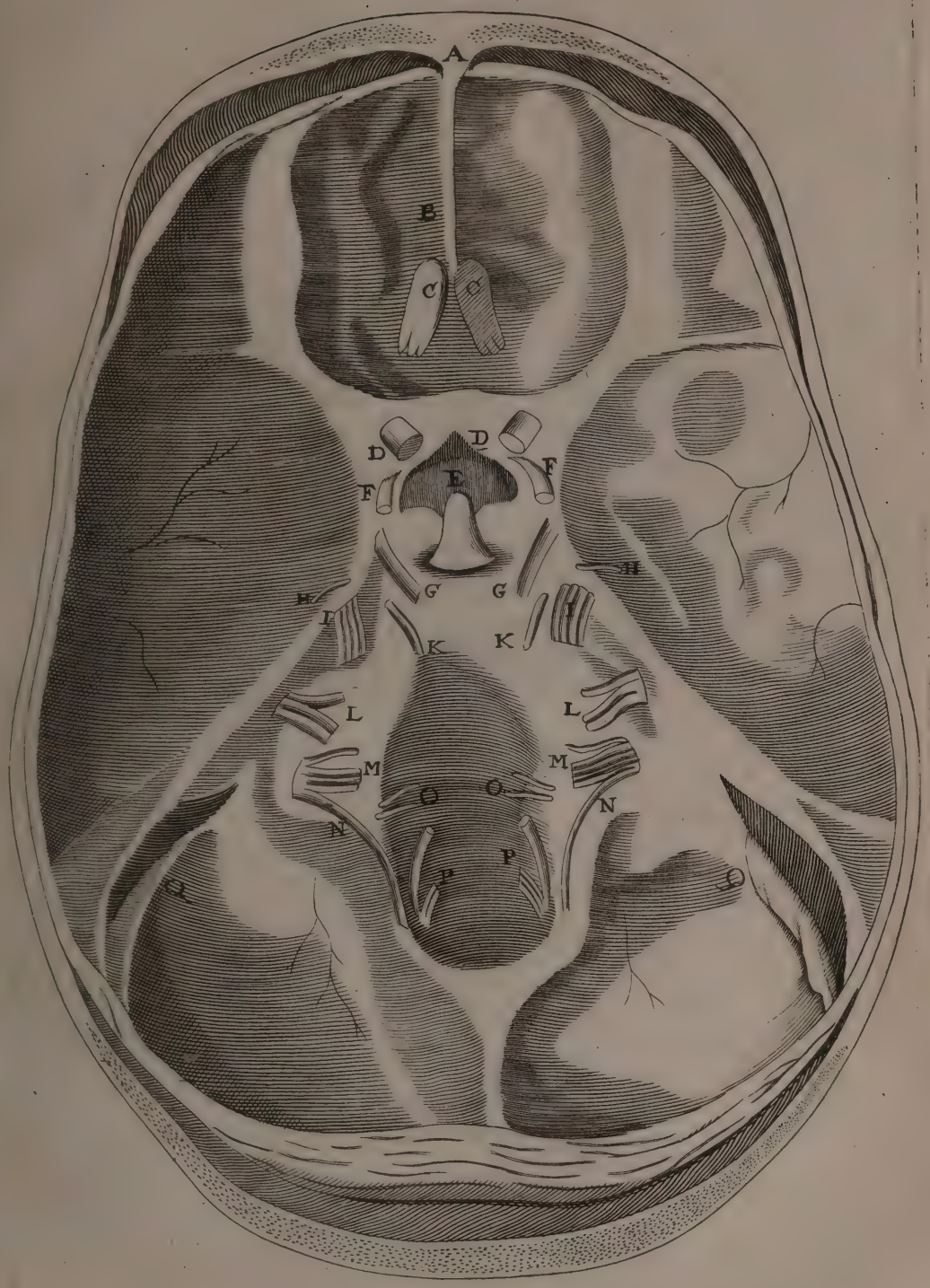
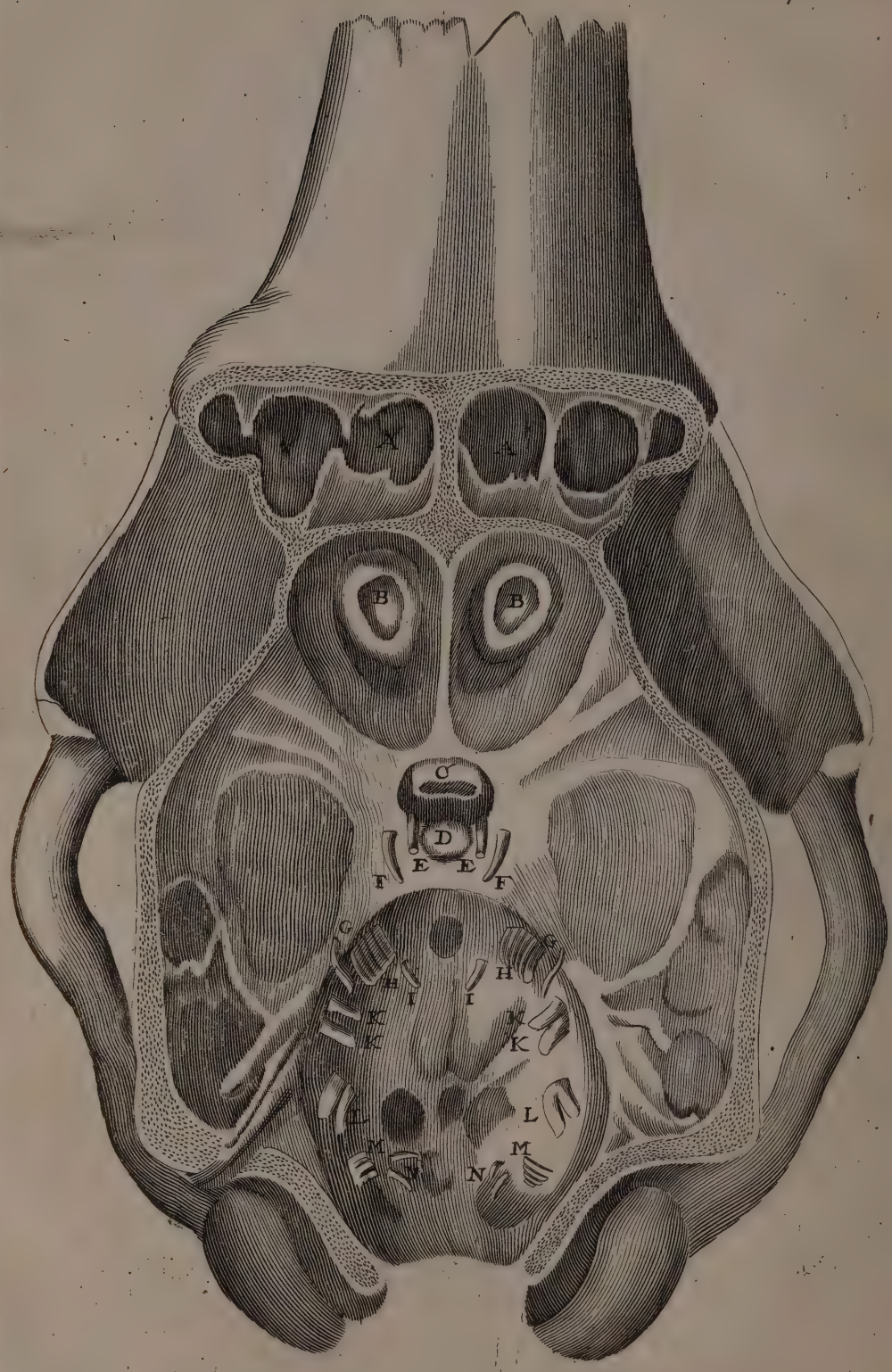


Fig. VI. *FF. p. 61.*



The Sixth Figure.

SHews *the Baſis of a Calfs Skull; where is ſhewn after what manner the Veſſels cut off from the Brain, and about to go out from the Skull, are drowned under the* dura Mater.

AA. *The hollowneſſes of the ſpongie Bone.*
BB. *The mammillary Proceſſes, which, the ſmelling Nerves being cut off, appear hollow.*
C. *The Optick Nerves united, being preſently ſeparated again, they go out of the Skull.*
D. *The pituitary Kernel.*
EE. *The Carotidick Arteries emerging nigh its ſides.*
FF. *The motory Nerves of the Eyes going out of the Skull.*
GG. *The pathetick Nerves of the Eyes, hid under the* dura Mater, *going out of the Skull at the ſame hole with the former.*
HH. *The fifth pair of Nerves demerſed under the* dura Mater.
II. *The ſixth pair drowned under the* dura Mater, *and going out at the ſame hole with the Fourth and Fifth.*
KK. kk. *The ſeventh pair entring the ſtony Bone with a double Proceſs.*
LL. *The eighth pair, or the wandring pair, with many Fibres, and an acceſſory Nerve, ſeen to grow together, going out of the Skull.*
MM. *The ninth pair.*
NN. *The tenth pair tending downwards, hid under the* dura Mater.

CHAP. V.

The Brains of Fowls and Fiſhes deſcribed.

WHat hitherto we have ſhewn concerning the deſcription of the Brain and its Appendix, we chiefly owe to the obſervations made of the diſſection of the Heads of a Man and of four-footed Beaſts. We ſhall now proceed to the commenting upon theſe Obſervations; to wit, that we may endeavour, from the fabrick rightly conſidered of the parts of the Brain, ſo deſcribed, to erect their offices and uſes, and ſo to deſign the government of the animal Function: But becauſe a compared Anatomy may yield us a more full and exact Phyſiology of the Uſe of Parts; therefore before I enter upon this task, it will ſeem worth our labour to inquire into the Heads of ſome other Animals, to wit of Fowls and Fiſhes.

We have already hinted, that the Brains of Men and of four-footed Beaſts, were alike in moſt things; and alſo that the contents in the Heads of Fowls and Fiſhes being far different from both the former, yet as to the chief parts of the Head, are found to have between themſelves an agreement. The kinds of either Animals being coetaneous, and as it were Twins from the Creation of the World, do teſtifie their affinity in nothing more than in the fabrick of the Brain. That it is ſo in Man and four-footed Beaſts plainly appears already: we ſhall now ſee if that the Anatomy of Fowls and Fiſhes will ſhew us any thing worthy of note.

That we may begin with Fowls; the covering of the Skull being taken off, the hard *Meninx* or Membrane embraces ſtrictly the bulk or mole contained within. In the midſt of it, where the brain is divided into two Hemiſpheres, it hath a boſom ſtretched out at length, which notwithſtanding, no *Falx* (or Scythe) being let down between the interſtices, is inſerted leſs deeply in the brain; then, where this Membrane diſtinguiſhes between the Brain and Cerebel, two lateral boſoms are formed. Beſides in Fowls there is a fourth boſom, which hath its place a little more backward than in men or four-footed beaſts; for a little below the pineal-Kernel a hollow and ſmooth proceſs of the hard *Meninx* is ſent down npon the ſhanks of the oblong marrow, where preſently it is divided into two branches, on either ſide whereof it it ſends forth one upwards into the cavity between the ſtreaked Membrane and the Hemiſphere of the brain, planted in the hinder part of the brain.

This ſuperior Membrane or hard *Meninx* being cut off, and ſeparated round about the *Pia Mater*, appears very thin, which is not, as in man or other perfect Creatures, marked with ſuch frequent infoldings of the Veſſels; but this moſt ſubtil *Meninx* being made of a texture of Fibres, only clothes, and every where intimately binds about the even and plain ſuperficies of the brain contained within, and wholly deſtitute of turnings and windings about.

The fabrick of the brain in Fowls is otherwiſe than in man or four-footed beaſts: for beſides that in its compaſs the inequalities and the turnings and windings are wholly wanting; alſo more inwardly, the callous body and the *Fornix*, as alſo the chamfered bodies, which we deſcribed before, are all lacking: and beſides, the ſubſtance of the Brain it ſelf is figured after another manner. That theſe may the better be

be beheld, make the diſſection of the Brain of a Gooſe or a Turky-Cock; and the Membranes being cut off, by preſſing lightly the fiſſure or cleft of the Brain, you may divide the middle of it one from another, and go forward to ſeparate it, till you come to its boſom, in which place are two marrowy bodies, which being ſtretched out like Nerves, connect the Hemiſpheres one to another. Either ſide of the *Interſtitium* or the ſpace between, is clothed with a whitiſh Membrane, which is marked with ſtreaks or beams, lying or running from the whole compaſs or circumference, to the lower corner; and theſe ſtreaks concenter about the inſertions of the medullary bodies. Then, if this Membrane be cut, in either Hemiſphere of the Brain there will appear underneath a cavity, which goes under the whole ſpace, from the ſide of the *Interſtitium*, and for a great part, the hinder region of the Brain, and is arched or chambered with that ſtreaked Membrane. Either cavity or hollowneſs, about the bottom, is opened into an intermediate or common paſſage, which lies open to the Tunnel; and from either ſide of this paſſage the ſhanks of the oblong Marrow are ſtretched out, to which, on either ſide, the Hemiſphere of the Brain is hung by two medullary bodies; to wit, one marrowy or medullary body goes out from the mole or ſubſtance of the Brain lying under the Ventricle, the other from the ſtreaked Membrane covering the Ventricle. From theſe two, placed on either ſide, the medullary bodies being ſtretched out croſswiſe, like Nerves, joyn the two Hemiſpheres of the Brain to one another. Beſides, theſe two growing together on either ſide, fix either Hemiſphere of the brain to the ſhanks of the oblong marrow.

So the Figure of the Brain in Fowl, if you compare it with the Brain in men and of the more perfect four-footed Beaſts, ſeems to be as it were inverſed. For as in theſe the Cortical part is outward, and the medullary laid under it; ſo in Fowls, the lower frame of the Brain, which conſiſts of a thick and cloſer ſubſtance, is inſtead of the *Cortex* or Shell; but the outmoſt and upper Membrane, chambering the Ventricle, appears medullar or marrowy above any other part. Moreover, the Ventricles in the Brains of a Man and four-footed Beaſts are beneath, and near the bottom; in Fowls, above and nigh the outward border. The reaſon of this difference ſeems to be, becauſe placed in a more perfect brain, ſuch as is in Man and four-footed Beaſts, the animal Spirits have both their birth and exerciſe; *viz.* they are procreated in its Cortical or ſhelly part, and in its medullary, which being large enough, lyes under this, they are circulated and variouſly expanded for the acting of their faculties. But truly in the Brain of Fowls there is ſpace enough for the generation of Spirit, but for their circulation there is ſcarce any left: to wit, the Brains of Birds ſeem not to be much poſſeſſed with the gifts of phantaſie or memory: yea it is thought, that the Spirits begotten in the Brain are exerciſed chiefly in the oblong Marrow for the preſerving the animal function; for there, as we ſhall ſhew anon, the medullary ſubſtance, which is inſtead of the callous body, conſiſts; and like the ſtreaked bodies in others, in theſe are ſtreaked Membranes, through which the Spirits, procreated in the Brain are carried, without any order there, forthwith into the oblong Marrow: but becauſe the Spirits, begot in the brain, ought to lay aſide a ſerous excrement; therefore the Ventricles from the complicature of the ſtreaked Membrane upon the keel or lower part of the brain, and on the oblong Marrow it ſelf, do ſerve conveniently enough for this buſineſs. Notwithſtanding, becauſe in the Brains of Fowls, the *Fornix* is wholly wanting, there are only two anterior Ventricles; between which, the Choroeides infolding is ſtretched out; the veinous portion whereof, as was but now ſaid, ariſes a little lower from the fourth boſom; but the Arteries aſcending, come from either ſide of the oblong marrow.

Nor is there a greater heterogeneity or difference of conformation in the Brain it ſelf of Fowls, than in the oblong Marrow from the ſame in men and four-footed Beaſts. For in the firſt Section, from whence the Optick Nerves ariſe, two noted protuberances grow to either ſide. Theſe are much greater in proportion than the orbicular prominences in the more perfect Creatures; ſo that they ſeem another additional Brain: either of them of a white colour, and purely marrowy, is hollow within; ſo that in theſe kind of Animals are found two Bellies or Ventricles in the Brain, and as many in the oblong Marrow. And ſeeing in theſe, as in all other Animals, a cavity is put under the Cerebel, the Ventricles in the whole Head differ as well in number as in figure and poſition.

In the middle of the medullary Trunk, to wit, where thoſe prominences grow to its ſides, the Chink, leading to the Tunnel is cut, but into it the aperture of either Ventricle gapes or opens, that it is not to be doubted, but that the ſeroſities heaped up there, are ſent out by that way. Moreover it is likely, that theſe hollow and medullary prominences in Fowls ſupply the courſe of the callous body, to wit, in which the animal Spirits are circulated for the exerciſing their Faculties: becauſe in the Brain the ſpace is ſo narrow, that the Spirits cannot be produced and circulated together within its confines. Further, as in Fowls, the uſe of the animal Spirits is required for the act of the ſenſitive and loco-motive faculty, more than for phantaſie or memory; certainly the chief place where they may meet and be exerciſed, ought to be placed rather in the oblong Marrow than in the Brain.

The Carotidick Arteries, which carry the blood to the brains of the greater Birds, are ſo ſmall, that there is no proportion of theſe to the ſame in man and four-footed beaſts. Their Trunks being carried within the Skull, aſcend without any branchings into net-like infoldings, after the ſame manner as in other Animals, nigh to the pituitary Glandula, and paſs right into the brain, and diſtribute ſome ſmall ſhoots of the Veſſels both to its exterior compaſs, and through its inward receſſes. But in truth, the brains of Birds are watered with a very ſmall portion of blood, in reſpect of other living Creatures; becauſe, where the fancy or imagination is little exerciſed, there is not much blood required for the refreſhing the animal Spirits.

Fowl

Fowl (otherwiſe than ſome affirm) have both the mammillary proceſſes, and the Cribrous or Sieve-like bone. For the anterior productions of the brain being highly extenuated and involved with the *Dura Mater*, ſtretching out almoſt to the middle part of the bill, are inſerted into the triangular bone, which hath a double boſom, diſtinguiſhed between with a thin mound or pale. But theſe proceſſes being dilated within the boſom of the aforeſaid bone, and in Bladders full of clear water, which are very like the mammillary proceſſes in a Calf, full of clear water. Beſides, as out of the fifth pair of Nerves a noted branch on either ſide paſſing through the ball of the Eye, enters into the cavern of the Noſtril, a ſhoot of it being ſent out of the Trunk, is beſtowed to the very Orifice of the Noſtrils; in the mean time, both the greater Trunks, compaſſing about the Cribrous bone, meet together, and preſently going one from the other, and being carried to the end of the bill, are diſtributed into the palate. After this manner Fowls, even as men and four-footed beaſts, are furniſhed with a peculiar organ of ſmelling, to wit, with a double mammillary proceſs; and beſides, they have within the Noſtrils additional Nerves out of the fifth pair, by whoſe action and communication of branches into other parts, and among themſelves, ſo ſtrict an affinity is contracted between the ſmell and the taſte. The other pairs of Nerves are almoſt after the ſame manner as in men and four-footed beaſts. In like manner we alſo obſerve, that there is no great difference as to the Cerebel and the other portion of the oblong marrow; between Birds and the other Animals we have already conſidered on, unleſs that the orbicular prominences before the Cerebel, and the other annulary under it, meeting within them, are both wanting in Fowls; indeed theſe latter ſeem not at all to be required; but inſtead of the former, they are eaſily ſupplied from the hollow medullary prominences, ſuch as we have ſhewn to be in Fowls.

And theſe are what are chiefly worth noting to be found in the brains of Fowls. We have already mentioned, that there is a certain likeneſs between theſe and Fiſhes as to the moſt parts of the head; wherefore it will ſeem to be to the purpoſe, that here for a concluſion we ſhould ſay ſomething of the brain of Fiſhes. Firſt, we ſhall obſerve, that as the heads of Fiſhes, in reſpect of the whole body, are greater than of any other living Creatures, yet they contain in them leſs brain than others. For two little moles or ſubſtances, placed before, ſuſtain the whole place of the brain, properly ſo called; out of theſe, two ſignal ſmelling Nerves proceed, which are carried by a long and ſtraight journey to the holes made hollow, out of either ſide of the mouth, and which are inſtead of noſtrils: and this is ſingular to Fiſhes. Moreover, we advertiſe concerning the Optick Nerves, that they, as in other living Creatures, inclining mutually one to the other, are not however united, unleſs perhaps towards the ſuperficies; but they are croſſed, and a Nerve ariſing from the right ſide of the oblong marrow, is carried into the left Eye, and ſo on the contrary: ſo indeed, that the viſory rays have their refraction, not only in the Eye, but within the very bodies of the Nerves. The oblong marrow in Fiſhes, wholly after the like manner as in Birds, hath two ſignal protuberances hollowed within; and in truth, as to local motions, the Spirits in either ſeem to be exerciſed after the like mode. For as Fiſhes ſwim in the water, ſo the flying of Fowls or Birds ſeems a certain kind of ſwimming in the Air. Further, in theſe 'tis obſervable, there are the pituitary Kernel, the Tunnel, and the Carotidick Arteries as in other Animals; alſo many pairs of the Nerves have the ſame origines and diſtributions, excepting that the hearing Nerves are here wanting; although *Caſſerus Placentinus* attributes this gift to the ſmelling Nerves. The figure of the Cerebel is the ſame as in more perfect Animals. Beſides, what we have remarked concerning the wandring pair of Nerves in man and four-footed beaſts; to wit, many fibres of it ariſing together, the trunk of the Nerve from the ſpinal marrow comes to them: in like manner the ſame is in Fiſhes. But to deſcribe them all further is needleſs; for the reſt, as thoſe which are proper to them only and Birds, as alſo thoſe which they have common with Fowls and the more perfect Animals, may be eaſily known, partly out of the peculiar ſimilitude with birds, and partly out of the univerſal Analogy of all. Therefore we will now philoſophiſe upon the Uſe and Action of the Brain and its Parts, and of its Appendix, together with the whole œconomy of the animal Function: where in the firſt place, we will inquire into the offices of a more perfect Brain, ſuch as of man and four-footed beaſts; and alſo ſecondarily and collaterally we ſhall explain the Offices and Actions of a leſs perfect Brain, and of its Parts, ſuch as that of Fowls and Fiſhes.

CHAP. VI.

Of the Offices of the Brain and its Parts: where firſt of all the Uſes of the Skull and the hard Meninx or Dura Mater *is treated of.*

THE Poets feigned *Pallas* to be formed within the Brain of *Jupiter*, and from thence to be born. In truth, within the Womb of the Brain all the Conceptions, Ideas, Forces, and Powerrs whatſoever both of the Rational and Senſitive Soul are framed; and having there gotten a ſpecies and form, are produced into act. Wherefore it will be worth our labour to inquire into theſe places, of the generation of theſe more noble faculties, and the firſt riſe and primitive beginnings of them, as alſo more curiouſly to conſider the divers parts of the Brain, or the Organs ſerving to their Generation: And I go about this part of my labour the more willingly, that I may by handling the thread of our diſſection again, bring all the Phænomena, before given to our inſpection and ſenſe, before the Eye of Reaſon, and to be again weighed by a more ſevere Examination of Diſcourſe; at leaſt thoſe things which ſeem to be of the greater moment, and chiefly worth taking notice of. Neither do we think here to heap up into a great Volume the ſeveral things worn out by the handling of others, and offered to common obſervation.

Therefore recollecting the Anatomy of the Brain, the firſt things to be conſidered are its coverings, to wit, the Skull, and the two Meninxes or Maters. Concerning the firſt it is obſerved, that all perfect Animals have an hard and bony Skull. A double reaſon for which may be given: Firſt, that the Head being deſtinated for the moſt noble uſe, might be protected with a more firm and not eaſily penetrable covering, as a natural Helmet, againſt the injuries of external ſtrokes; beſides ſecondly, as this is in the place of Armor, ſo alſo of a Cloiſter; becauſe the ſame covering the *dura Mater* within, may reſtrain and keep within the Brain the Effluvia's of the animal Spirits, leſt they ſhould too thickly evaporate, or in heaps. Further, as the Skull for theſe ends is made bony, the efficient cauſe are the ſaline Particles of the blood watering the brain, which being unprofitable to the interior work of the animal Spirits, and ſo to be ſent away outwardly, grow together thus in the circumference, and are congealed into a ſtony hardneſs: For indeed the blood being carried towards the Head, as it abounds very much in Spirit, ſo in Salt; its Particles highly volatile, being joyned to the Spirits, are beſtowed on the brain; in the mean time, the ſaline little bodies, which are of a more fixed nature, being thruſt out into the circumference, from the Spirit implanted in the Brain, conſtitute the ſtony Skull, as it were a bubble covering incloſed wind.

Within the hollow ſuperficies of the Skull, there appear many furrows and inequalities imprinted by the proturberances of the Veſſels; and we perceive frequently either border or plate of it to be perforated by the paſſing through of the Veſſels in ſeveral places: but the Arteries, ariſing in the exterior ſuperficies of the *dura Mater*, make theſe kind of little ditches through the concavity of the Skull. For when the whole ſubſtance of the brain is at firſt ſoft, and eaſily giving place, like Wax; the Arteries underneath it continually beating, as it hardens by degrees, eaſily imprint the marks of their tracts.

The figure of the Skull in four-footed beaſts is narrow and preſt down, but in man, the ſubſtance of whoſe brain is large, there is required a more capacious and almoſt ſpherical figure. For as God gave him an upright countenance to behold the Heavens, and alſo endued his brain with an immortal Soul, and fitted for the ſpeculation of Heaven; therefore his face is erect or lifted up; ſo the brain it ſelf is placed in a more eminent place, to wit, above the Cerebel and all the Senſories. But in Brutes, and ſuch whoſe faces are prone towards the Earth, and have a brain unfit for ſpeculation, the Cerebel, however ſerving to the more noted action and office of the Præcordia, is placed in the higheſt ſeat to which the mole of the brain is ſubjected. Beſides, ſome organs of the Senſes, to wit, the Ears and Eyes, if they be not ſuperior, they are placed at leaſt equal to the brain. In an humane Head, the Baſis of the Brain and Cerebel being placed nigh together, yea of the whole Skull, is made parallel to the Horizon; whereby it comes to paſs, that there is leſs danger for any portion of the head to be jogged here and there, or to be moved out of its proper ſeat; But in four-footed beaſts, who go with an hanging down head, the Baſis of the Skull makes a right angle with the Horizon; wherefore the brain being ſubjected, the Cerebel is put in the higheſt place; ſo indeed, that this ſeems leſs ſtable, and that it may ſhake, or be moved from its ſeat. However againſt this inconvenience, leſt a frequent concuſſion of the Cerebel might induce a ſinking down or loſs of the Spirits, or irregularities about the Præcordia, in ſome it is taken care of by a wonderful artifice of Nature; for as in all the frame or ſubſtance of the Cerebel is moſt ſtrictly bound faſt together by the *Dura Mater*, beſides in ſome it is ſtaid by a bony fence; but in others, as in a Hare, Rabbet, and other leſſer Brutes, a certain portion of the Cerebel is included on either ſide by a ſtony bone, and ſo by this double hold its whole bulk or ſubſtance is firmly tyed to the Skull. Concerning the chief bones of the Skull, *viz.* the Cuniform or Wedge-like bone, the Cribrous or Sieve-like bone, and the auditory or hearing Organ, they ſhall be ſpoken of in their proper places, when we come to treat particularly of the Ventricles

Ventricles of the Brain, and of the Senſes to which theſe bones ſerve. We ſhall paſs next to the hard *Meninx* or *dura Mater.*

The *dura Mater* or hard *Meninx*, formed of a double kind of Veſſels and Proceſſes, bears alſo a double Aſpect, and ows part of its office to the Skull, that is about it, and part to the *Encephalon* contained within it. The exterior proceſſes of this Membrane are inſinuated within all the boſoms and cavities of the Skull; to ſome whereof they are a covering and defence, but to others they impart a ſenſible force, which manifeſtly appears in the Sieve-like bone, through whoſe holes the fringes of this Membrane paſſing, conduce ſomething to the ſenſe of ſmelling. Alſo the productions of this, lying over the receſſes and caverns of the Wedge-like bone, fortifie the ways for the entrance and coming out of the Veſſels. The interior proceſſes of the *dura Mater*, which belong to the Head, divide and diſtinguiſh between the parts of the Brain and Cerebel; and in thoſe places the *dura Mater* is very thick, leſt in any great concuſſion of the Head, theſe two ſhould be ſmitten one againſt another, and ſhould preſs one upon the other. Wherefore in Dogs (as we have already hinted) who are wont to run violently with their heads down, there is ſent down between theſe bodies a bony fence. In like manner in a Cat, Horſe, Fox, and many other Animals, from whoſe manner of living and uſe it is required, that they be moved with a ſwift motion, that bony fence, commonly called the Triangular Bone, is ſent down deeply between the Brain and the Cerebel; yea, and all the boſoms paſs through that bone in the holes curiouſly made hollow in it.

The Veſſels belonging to the *dura Mater* are either Arteries, that carry the blood thither; or they are Veins, which receiving from thence the ſuperfluous blood, and from the whole Head beſides, return it towards the Heart. As to the firſt ſort of Veſſels, on either ſide, two Arteries ariſing from the Carotidick Artery on the ſame ſide, before it comes to the Baſis of the Brain, are carried into the *dura Mater*: which notwithſtanding, only poſſeſſing the exterior ſuperficies or convex part, carry blood and juyce to this Membrane, alſo in ſome meaſure to the Skull and its coverings. As to the Veſſels carrying the blood back, this Meninx contains four, into which, as into a great Sea, all the Rivulets of the Arteries, ſerving the whole Head, do exonerate themſelves: to wit, there are obſerved in this Membrane four noted Cavities, commonly called Boſoms; which are diſpoſed after that manner, that, like Promptuaries or Store-houſes framed in ſeveral places, they receive the blood returning from every region and corner of the brain: For the third boſom, or the longitudinal, looks towards the anterior brain, the fourth towards its middle; but the firſt and ſecond admit the blood flowing back from the Cerebel and hinder part of the brain. Further, out of theſe the third and fourth disburden themſelves into the firſt and ſecond, and theſe at length transfer their burden into the Jugular Veins. On every ſide, from theſe boſoms, the leſſer Veſſels, *viz.* the chanels of the Veins are ſent forth, which going out nigh the interior or concave ſuperficies of the *dura Mater*, are preſently inſerted into the *Pia Mater*, and following its protenſion, being diſtributed through the whole compaſs, and all the interior receſſes of the brain and its Appendix within the Skull, and being complicated with the Arteries, receive the ſuperfluous blood, and carry it into thoſe greater cavities. That it is ſo, it plainly appears, becauſe if you ſquirt a liquor, dyed with Ink, into the Pipe of the Artery, that paſſing through the arterious ſhoots, and then the veinous, goes through at laſt into the boſoms.

Whilſt the blood, returning from the whole interior Head, is collected within thoſe boſoms, as with a full belly, it ſeems alſo in another reſpect to be of a very notable uſe; to wit, for the ſupplying of heat, requiſite for the diſtilling forth of the animal Spirits, as if it were a certain Chymical operation. For as much as the blood to be diſtilled, is contained in the Veſſels, interwoven into the *Pia Mater*, the ſuperiour Rivers diffuſed on every ſide through the *dura Mater*, the heat being brought to it like a *Balneum Mariæ*, flow about the under-lying blood, and ſo force out of it a moſt ſubtil Liquor into the ſubſtance of the Brain; or rather, the blood raiſing up heat within the boſoms, is like the fire of ſuppreſſion, which in the diſtillation by deſcent, is inkindled round about the Veſſel containing the matter to be diſtilled. For indeed the interior ſubſtance of the Brain, for that it is endued with plenty of Salt and very little Sulphur, is of a more frigid temper: wherefore, that from the blood watering its ſuperficies, the ſpirituous part may be ſtilled forth, and forced into its middle or marrow, the degree of the ambient heat ought to be made the more ſtrong, ſuch indeed, as the blood collected in the ample Eſtuaries of the boſoms, may eaſily afford. Further, as thoſe boſoms being diſtended with heated blood, are like a certain diſtillatory Bath; ſo the other Membrane of the *dura Mater* being ſtretched out about the whole Head, is like an impervious Alembick, which with its covering keeps within the ſpirituous breaths, that they may not be immoderately evaporated.

Concerning this Membrane there may yet be conſidered, with what motion or ſenſe it is endued. And as to ſenſe, 'tis not to be doubted, but that it hath it exquiſitely: For ſince all the Membranes have feeling, and owe that faculty to the afflux of the animal Spirits from the Brain, ſurely this Meninx, for that it is nearer and very much of kin to the Brain and its Appendix, ſo that it clothes very many Nerves going out of the Skull, it obtains a very accurate virtue of feeling: which thing alſo may be argued from the effect; becauſe the pains of the Head often proceed from the breach of unity excited in this Membrane. But that it hath motion, it can hardly be thought, becauſe it is tyed in very many places to the Skull; and yet it is probable, that the ſame may ſometimes, in ſome parts at leaſt, be contracted and wrinkled or drawn together: And certainly there is no doubt, that it is contracted and remitted in ſneezing.

In like manner, when from an hurt of this a Vomiting or Convulsive motions follow in the *Viscera* or Members, this Membrane is the cause, which being somewhere contracted or divided, infolds with it self the substance contained within the same Convulsion or Spasm.

Concerning the motion of this Membrane, a curious mind may yet further consider its texture, and especially how it is within the cavities of the bosoms, and the *Interstitium* or separation of the Brain and Cerebel. For in these places are found many Fibres, or as it were greater or nervous cords or strings, such as we have observed to be variously stretched out in the Ventricles of the Heart. Within the bosoms, from the various processes of the Membrane, a cavity full of turnings and windings, and manifoldly divided, as it were with many little Cells, is constituted. This seems to be thus made, to this end, to wit, that the blood returning back from divers little rivers into the cavities of the bosoms, may be retarded by several obstacles, as it were little flood-gates; lest perhaps rushing too impetuously and by heaps, it might flow within this Sea with a vertiginous and inordinate motion. But there is observed, besides these intrications and little cells of this Meninx in the heads of four-footed beasts, that moreover in the whole cavity of the bosoms, very many cords, as it were Ligaments, are every where produced from one side to the other. The office of these is partly, that they may contain the sides of the cavity within their due ends of aperture and dilation, lest they should be distended above measure by the vehement rushing in of the blood, and so may press upon the substance of the brain. Yea the contexture of these whitish Fibres, which are met with, both within the cavities of the bosoms, and in this Meninx, going about the Cerebel, and distinguishing between it and the Brain, seems to intimate, that they serve also to some motion. For it may be suspected, that those strong Fibres, and as it were Ligaments, do sometimes contract, sometimes dilate, and variously draw the Membrane to which they are knit. From these kind of motions of the *dura Mater*, the blood flowing within the bosoms, may be variously agitated, and as occasion serves, sometimes hastened in its Circle, and sometimes restrained or hindred; for in many affections of the sensitive Soul, the blood being disturbed from its equal circulation, is sometimes precipitated by heaps and impetuously to the Heart, and sometimes detained from its nest longer, nigh the confines of the Brain. But that various whirl-winds of passions stir up such irregularities in the motion of the blood, the nervous parts implanted about the *Præcordia*, are in some measure the cause, which by contracting or dilating the same, variously moderate the course of the blood, yet so, that in the mean time, some part of this office is due from the brain it self, or at least to its Appendix. Indeed the brain it self wants motion; but the blood passing through its substance, for as much as it is poured wholly in this Meninx, and passes through its receptacles, is at the motion and beck of this Membrane, sometimes driven away from the brain, and commanded to succour the Heart, as in fear and great sadness, sometimes being hastened towards the brain, is for some time prohibited from flowing back, as in shame, indignation, and some other affections.

Truly, that these kind of interior processes of the bosoms, and as it were transverse strings or cords, do conduce to the more commodious reduction of the blood, we gather also from hence, that in working beasts, whose brain (because they feed and go with a prone and hanging down head) is in greater danger of an inundation of the blood, those processes are very big, for that they being successively contracted, may leisurely thrust out the blood, apt otherwise to stagnate by reason of the inclination of the head. Neither is it from the purpose to observe here, that these same Animals are always furnished, for that reason, with a greater wonderful Net: by which means indeed it is provided, that the blood may not too much invade the brain by heaps; as care is taken by the artifice but now described, lest the same should make too long stay in the brain, and so oppress its more weak frame.

Therefore in the last place, that I may recollect what I have said of the *dura Mater*, and rehearse its chief uses: First, It covers over the Skull within, and reaches to it somewhat of nourishment by the Vessels. Secondly, It is a covering to the whole head, and serves to distinguish its chief parts. Thirdly, It contains the Vessels designed for the reducing the blood from the whole interior head; which, in the mean time, by reason of the plenty of the blood contained in them, and the opportunity of their situation, administer requisite heat for the distillation of the Spirits. Fourthly, It provides ways for the admission and going out of all the Vessels within the Skull, and fortifies them; to which may be added, that it bestows on some of them their Coats; as shall be shewn anon. Fifthly and lastly, This Meninx being here and there contracted or divided by the animal Spirits variously moved, according to the passions of the Soul, or the necessities of Nature, stays the blood sometimes longer near the confines of the Brain, sometimes drives it forward from thence towards the *Præcordia*.

CHAP.

CHAP. VII.

Of the thinner Meninx or Pia Mater, *of its ſtretching out, as alſo of the Infoldings of the Veſſels every where interwoven with it.*

THE interior *Meninx* or *Pia Mater* is far thinner than the extetior, and conſiſts of a moſt ſubtle contexture of Fibres. This does not compaſs about the *Encephalon*'s ſuperficies as looſly as the *Dura Mater*; but embraces it ſo very ſtrictly, that it is very hardly ſeparated from it: beſides, it inſinuates it ſelf into all its turnings and windings and furrows, and clothes their inward parts. Further, this *Meninx*, although it be thin, yet being covered over throughout with the infoldings of Arteries and Veins, is interwoven with them, and ſo waters all the ſpaces of the Brain and Cerebel with innumerable rivers. For as the Region of either of theſe, eſpecially of the Brain, is full of turnings and windings, this Membrane in like manner grows to the deep furrows of the crankling turnings about, and alſo to the tops of the ridges; yea, the chief complications of the Veſſels are ſtill placed in the vallies, as if they were there hid in regard of their ſafety. Neither doth this *Meninx* only cover the gapings of the turnings and windings about; but alſo gathers together the tops or heights of all their interſtices or places between, and knits them together, and ſo makes the whole ſuperficies of the Head plain, globous, and as it were like the World.

That the diffuſion of this wonderful Membrane into all the turnings and windings of the Brain, and the diſtribution of the Veſſels through thoſe moſt intimate receſſes, may be the better beheld; let the head of a man, or of a brute beaſt that dyed of the Dropſie, be opened: For in ſuch, whoſe brain abounds with much moiſture, the little ſtays, whereby this Meninx is fixed to the ſubſtance of the brain, are looſned, ſo that the Membrane, with the infoldings of the Veſſels, may be eaſily drawn away, and pulled off almoſt whole: which indeed being pulled off, the folds of the brain will appear naked: alſo the inſertions of the Veſſels every where into the more inward ſubſtance of the brain, may be perceived. But to a ſound and dry brain the *Pia Mater* ſticks ſo cloſely, that it can ſcarce be drawn away in any part, or ſeparated with a Penknife.

We have already ſhewn after what manner the Veins and Arteries (which creeping like Ivy, are knit into the *Pia Mater*, and variouſly interwoven into it) cover over with moſt thick little ſhoots, the whole compaſs of the Brain and Cerebel, and their Interſtices, the gapings of the crankling turnings and windings about, boſoms and cavities, and ſend forth every where ſmall ſhoots into the medullary ſubſtance; ſo that it is not to be doubted, but that the animal Spirits, being as it were ſtilled forth immediately from the blood, every where in the whole head, are received into the Pores and paſſages of the Brain and Cerebel. From whence it will be eaſie to aſſign the uſe or office of the *Pia Mater*, *viz.* Firſt, this Membrane clothes the univerſal parts of the whole *Encephalon*, and diſtinguiſhes them all one from another. For indeed, this lying over all the gapings and interſtices of the turnings and windings, is inſtead of a mound or fence, by which the animal Spirits are reſtrained every where within their proper cells and orbs of expanſion, nor are they permitted by this means to run beyond their bounds, and ſo confound the acts of the many Faculties. Then ſecondly, this Meninx ſuſtains all the blood carrying Veſſels, *viz.* both the Arteries and Veins, together with their manifold productions, and ſo affords a paſſage to the blood, by carrying it to and fro towards the brain.

Concerning theſe Veſſels, which are knit to this Meninx, and follow its ſtretching out into all parts, there are many admirable things to be met with, and highly worthy of note, the uſes and reaſons of which is our purpoſe to ſearch into.

As to theſe, we ſhall firſt obſerve, that theſe Arteries and Veins, otherwiſe than in any other part of the body beſides, not ariſing nigh one another, go forth as companions, but going forth from oppoſite ends, meet every where mutually, *viz.* the Arteries aſcend from the Baſis of the Skull, and by creeping through the whole, emit upwards ſhoots and branches, which are met by the Pipes of the Veins ariſing out of the boſoms, and carried downwards. By this means the rivers of the blood ſeem to be made equal every where in the Brain, *viz.* whilſt the ſmaller ſhoots of the Veins follow or match the greater branches of the Arteries, and on the contrary, the ſmall branches of the Arteries the Trunks of the Veins.

Secondly, We have already ſhewn, that theſe Veſſels are variouſly and very much ingrafted or inoculated among themſelves, not only the Arteries with the Veins, but what is more rare and ſingular, Arteries with Arteries; to wit, the Carotidick Arteries of one ſide, in many places, are united with the Carotides of the other ſide; beſides the Vertebrals of either ſide among themſelves, and are alſo inoculated into the poſterior branches of the Carotides before united. The joynings together of the Carotides, in moſt living Creatures, are made about the Baſis of the Skull under the *Dura Mater*, and that after a diverſe manner, in ſome communicated through the Veſſels of the Wonderful Net from one ſide to the other; in others (as in a Horſe we have obſerved with a certain admiration) the arterious chanel is produced

produced between the Trunks of the *Carotides*, whereby the blood may be carried from one ſide to the other, and ſo on the contrary. But beſides, between the *Dura Mater*, about the Baſis of the Head, the ſame kind of ingraftings of the Arteries are ſtill ſeen in man and all perfect four-footed beaſts.

The reaſon of theſe ſeems to be partly, that the blood to be carried from the Heart into divers Regions of the Brain, might be exactly mingled as to its parts and particles, before it come to the place deſigned. For the Torrent of the blood, becauſe divided into leſſer rivulets, is incident to languiſh in ſo long a circuit, and its Spirits to be depauperated, and laſtly it ſelf to grow cool; unleſs that various courſes of its *Latex* ſhould anew inkindle this vital flame about to be extinguiſhed or dye.

But there is another reaſon far greater than this of theſe manifold ingraftings of the Veſſels, to wit, that there may be a manifold way, and that more certain, for the blood about to go into divers Regions of the Brain, laid open for each; ſo that if by chance one or two ſhould be ſtopt, there might eaſily be found another paſſage inſtead of them: as for example, if the *Carotides* of one ſide ſhould be obſtructed, then the Veſſels of the other ſide might provide for either Province. Alſo as to the *Vertebral* Arteries, there is the ſame manner of proviſion made. Further, if both the *Carotides* ſhould be ſtopped, the offices of each might be ſupplied through the *Vertebrals*, and ſo on the other ſide the *Carotides* may ſupply the defects of the ſhut up *Vertebrals*.

After this manner, leſt there ſhould be wanting an afflux of the blood at any time in any part of the Brain, or its Appendix, within the Skull, there is care taken with ſingular Art: For as there are four diſtinct paſſages, and thoſe remote one from the other, of this *Latex*, if perchance three of them ſhould happen to be ſhut up, the blood being carried through one only, will ſoon ſupply or fill the chanels and paſſages of all the reſt. Which thing I have found by experience often tryed, not without admiration and great pleaſure. To wit, I have ſquirted oftentimes into either Artery of the *Carotides*, a liquor dyed with Ink, and preſently the branches on either ſide, yea and the chief ſhoots of the Vertebrals, have been dyed with the ſame tincture: yea, if ſuch an injection be ſometimes iterated by one only paſſage, the Veſſels creeping into every corner and ſecret place of the Brain and Cerebel, will be imbued with the ſame colour. Alſo in thoſe who have the wonderful Net, the Tincture or dyed Liquor being injected in one ſide, it will come through the Net like infoldings of the Veſſels in both ſides. Hence it plainly appears that there is a communication between the Veſſels watering the whole Head; and although every Artery is carried to one only Region, as its peculiar Province, and provides for it apart; yet, leſt any part ſhould be deprived of the influence of the blood, more ways lye open to every part by the ingraftings of thoſe veſſels; ſo that if the proper veſſels by chance ſhould be wanting in their office, its defect may preſently be compenſated by others neighbouring.

It is not long ſince we diſſected the dead body of a certain man, whom a great *Scirrhus* or hard Swelling within the *Meſentery*, growing at laſt ulcerous, had killed. When his Skull was opened, we beheld thoſe things belonging to the Head, and found the right *Carotides*, riſing within the Skull, plainly bony or rather ſtony, its cavity being almoſt wholly ſhut up; ſo that the influx of the blood being denied to this paſſage, it ſeemed wonderful, wherefore this ſick perſon had not dyed before of an *Apoplexy*: which indeed he was ſo far from, that he enjoyed to the laſt moment of his life, the free exerciſe of his mind and animal function. For indeed, Nature had ſubſtituted a ſufficient Remedy againſt that danger of an *Apoplexy*, to wit, the *Vertebral* Artery of the ſame ſide, in which the Carotidick was wanting, the bulk of the Pipe being enlarged, became thrice as big as both its Pipes on the other ſide: becauſe, the blood being excluded the Carotidick, adding it ſelf to the wonted proviſion of the Vertebral Artery, and flowing with a double flood into the ſame belly, had ſo dilated the chanel of that Artery above meaſure. This Gentleman, about the beginning of his ſickneſs, was tormented with a cruel pain of the Head towards the left ſide. The cauſe whereof cannot be more probably aſſigned, than that the blood excluded from the right Carotidick Artery, when at firſt it ruſhed more impetuouſly in the left, had diſtended the Membrane; and therefore the ſame diſtemper did afterwards vaniſh of its own accord, to wit, the ſuperfluous blood being derived through the *Vertebral* Artery.

Thirdly, Concerning theſe ſanguiferous Veſſels covering the *Pia Mater*, we obſerve, that the Arteries and Veins, whilſt they meet one another, going out from oppoſite ends, do not only transfer their burden immediately through the ſeveral branches or ſhoots, mutually ingrafted, as is wont to be done in other parts of the Body; but being variouſly complicated and interwoven, do conſtitute every where admirable infoldings, into which, for the moſt part, very ſmall and very numerous Glandula's or Kernels are inſerted. Which thing is ſeen, not only in the infoldings, which are called *Choroiedes*, (by which name, beſides thoſe which are found within the plicature or folding up of the Brain, we alſo intend others planted together behind the Cerebel) but theſe kind of infoldings of the Veſſels, with Glandula's ſowed between, are ſeen every where to be ſprinkled through the whole compaſs and interior receſſes of the Brain and Cerebel, and eſpecially between the gapings of their turnings and windings and interſtices. This is clearly manifeſt in a moiſter Brain, or in an Hydropical, where the very ſmall Glandula's, which otherwiſe are ſcarce to be ſeen, being intumified by the moiſture, are eaſily beheld. Moreover, from the aforeſaid infoldings, on every ſide implanted, little ſlender Veſſels, being every where ſent forth, enter the Cortical, and in ſome meaſure the medullary ſubſtance of the Brain and its Appendix, for if you ſquirt into the *Carotides* a black liquor, beſides the ſhoots of the Veſſels, which it dyes every where with the ſame colour, little blackiſh pricks will appear ſprinkled in the ſubſtance of the Brain. Further, if the

Brain

Brain of a living Animal be cut up, the live blood will ſpring forth both from its *Cortex* and medullary part. The reaſon and end of all which, if they be inquired into, it ſeems that theſe foldings of the Veſſels, being variouſly complicated with repeated windings about, as if they were little ſerpentine chanels hanging to an Alembick, through whoſe narrow ſtraits the blood paſſing with a long circuit, becomes ſtill more ſubtil and elaborated: to wit, its thicker part, being by degrees put off in its paſſage, or ſent away by the little branches of the Veins, and ſo at length the only pure and moſt ſpirituous blood, and it ſelf now ready to go into animal Spirits, is admitted within the Pores and paſſages of the Brain. But as the blood or ſanguinolent part is ſupped up by the Veins, ſo it's very likely the Serum or watry part is received by the Glandula's or Kernels interwoven in them. For it appears not for what other end theſe Arteries are every where beſet with ſo many Kernels, unleſs they ſhould lay up in them the ſuperfluous ſeroſities. Between theſe infoldings there appear not any Nerves to be found, which may require any juyce or ſerous humor from theſe Kernels; and 'tis not yet found, whether theſe Lymphæducts or Water-carriers be accompanied with any Veſſel: wherefore it may be lawful to ſuppoſe, that whilſt the purer and ſpirituous part of the blood, being ſeparated from the reſt of its maſs, is ſtilled forth into the brain, the ſerous humidities are received by the Glandula's, which are numerous, and that they are for ſome time retained by them, till they may be ſent away into the Veins growing empty again.

Thus far we have beheld only the ſuperior branchings forth of the blood-carrying Veſſels, which are every where interwoven in the *Pia Mater*; and their infoldings, which like the leaves of a Wood, or creeping Ivy, cover the exterior compaſs of the whole Head. But by what means, and as it were Chymical Artifice, theſe Veſſels do inſtil the animal Spirits into the Brain and Cerebel, and ſerve for the uſe of one another beſides, ſhall be told anon, after we have conſidered of the inferior Aſpect and next the ground of this moſt thick Wood, *viz.* the greater Trunks of all the Arteries, which are deſtinated for the Brain, where they paſs through the Skull, and ſhew themſelves beyond it.

CHAP. VIII.

Shews with what difference the Arteries in various Animals paſs through the Skull; alſo for what uſe the wonderful Net is made, and the reaſon of it.

THE Arteries deſtinated to the Brain, are four in number, *viz.* two *Carotides*, and as many *Vertebrals*. Concerning the former, we have already obſerved, that their Trunks paſs through the Wedge-like Bone, as it were with a mechanical proviſion; to wit, either Artery is ſo bowed and intorted in its aſcent, that the blood, before it can reach to the Brain by a repeated ſtopping of ſhores, or hindred by a certain let or impediment, might flow to it leſs rapidly and more ſlowly. But this is not effected after one and the ſame manner in all Animals: for although the aſcent of the Artery be oblique and intorted in all, yet in ſome, *viz.* in a Man and a Horſe, it being bowed about with a greater compaſs, ſtill enters, even to the Brain, with a ſingle and undivided Trunk: when in moſt other beaſts the ſame paſſes the Skull with a leſſer circuit, and ſliding preſently under the *Dura Mater*, diverſifies it ſelf there into Retiform infoldings, commonly called the wonderful Net. Therefore it ſeems to be to the purpoſe, that we inquire into the various reaſons of this difference.

In the firſt place therefore we ſhall advertiſe you; that the Carotidick Artery in a man enters a little more backward the Skull, than in any other Animal, *viz.* nigh that hole through which the lateral boſom ſlides out of the Skull about to be implanted into the Jugular Vein; for in the reſt, this Artery ariſes within the Skull under the end or acute proceſs of the ſtony bone. But in an humane Head, the ſame being carried about by a longer compaſs, (that the Torrent of the blood, before it comes to the border of the brain, might flow ſlowly and pleaſantly with a broken force) attains to the baſis of the Skull nigh the den made by the ingreſs of the lateral boſom; where being preſently intorted, it enters the proper Chanel inſculped in the Wedg-like bone, and for the greater aſſurance it is clothed beſides with a thicker additional Coat. This double defence ſeems to be given it, leſt the blood, boiling up too much, and whilſt it is carried violently towards the head, ſhould make a Whirlpool about the ingreſs of the Skull, to wit, where it begins to be wreathed about from its direct aſcent, and ſhould break by its flood the banks of the Belly, unleſs they were more firm. The Artery being ſlid out of the bony channel, lays aſide alſo its aſcititious or additional Coat; and now being well enough defended within the Skull, goes forward clothed only with its proper Coat, and creeps under the *dura Mater*, and being as it were depreſſed in the midſt of its paſſage into a valley, being immediately carried out again, it goes on till it comes to the head of the Turky Chair; where again being bent in and intorted, with a certain compaſs, it aſcends ſtraight, and boring through the *dura Mater*, is carried towards the brain. The Trunk of this *Carotis*, like a Meander, paſſing through the Skull with a very much bending way or paſſage, is aptly repreſented in the firſt Figure of the following Table.

If

If the reaſon of this kind of Conformation be inquired into, it eaſily occurs, that in an humane Head, where the generous Affections, and the great forces and ardors of the Souls are ſtirred up, the approach of the blood to the confines of the Brain, ought to be free and expeditious; and it is behoveful for its River not to run in narrow and manifoldly divided Rivulets, which would ſcarce drive a Mill, but always with a broad and open chanel, ſuch as might bear a Ship under Saſl. And indeed, in this reſpect, a man differs from moſt brute beaſts, in which, the Artery being divided into a Thouſand little ſhoots, leſt it ſhould carry the blood with a fuller chanel, or more quick courſe than is requiſite, makes the Net-like infoldings, by which indeed it comes to paſs, that the blood ſlides into the Brain very ſlowly, and with a gentle and almoſt even ſtream. If that be true, as ſome affirm, that the wonderful Net alſo is ſometimes found in an humane Brain, I believe it is only in thoſe ſort of men, who being of a ſlender wit or unmoved diſpoſition, and deſtitute of all force and ardor of the mind, are little better than dull working beaſts in fortitude and wiſdom.

Secondly, The conformation of the Carotidick Artery in a Horſe, comes neareſt its ſtructure in a man for in this the Artery enters the Skull alſo lower, and with a greater compaſs than in other four-footed beaſts: which being paſſed, its Trunk being intorted, with a certain compaſs, and then a little depreſſed, goes forward whole to the ſide of the Turky Chair ſtill with a full and broad chanel: which truly ought to be made ſo, becauſe magnanimous and fierce forces are convenient for this Animal, born as it were for War and any dangerous attempts; and ſo there was need, that the blood might aſcend the Brain with a free and plentiful courſe, and (when occaſion requires) with a full Torrent. But though the blood paſſes through the Baſis of a Horſes Skull in the ſame undivided chanel, yet it ought not to come to the Brain it ſelf in one ſingle paſſage; becauſe the frame or ſubſtance of this in a Horſe being far weaker and colder than in a man, it might be overthrown and drowned by the blood ruſhing in by heaps: wherefore the great River of the Artery disburdens it ſelf by two Emiſſaries, and pours out its *Latex* at ſo many diſtinct places of the Brain. Further, as if by this means there were not yet ſufficient caution againſt the Deluge of the Brain, a tranſverſe or croſs chanel, as it were a diverſion, is formed between the chanels of either Artery; through which the blood, being ſtraitned for room, may go aſide, and flow and reflow from one bank or chanel to another, rather than oppreſs or overflow the Brain. Alſo beſides, certain ſhoots being ſent out from the Trunk of either Artery, are inſerted into the pituitary Glandula, the uſe of which is doubtleſs to ſeparate certain ſeroſities of the too watry blood, and to lay them up into that Glandula, whereby the reſt of the bloody *Latex*, to be carried to the Brain, becomes more pure and free from dregs. By what means the Carotidick Arteries, in the head of a Horſe, paſs through the Baſis of the Skull, is repreſented in the ſecond Figure of the following Table. I have not yet had the means to inſpect the brains of a Lyon or a Monkey; but there is reaſon to ſuſpect, that in theſe alſo the Carotides do paſs through the Skull with a ſingle Trunk. In a Sheep, Calf, Hog, yea in a Dog, Fox, Cat, and other four-footed beaſts, which I have hitherto opened, this Artery is devaricated into Net-like infoldings, which Veſſels, for what cauſes and for what uſes they are ſo made, we ſhall now inquire into.

Thirdly therefore, moſt other four-footed beaſts, different from a Man and a Horſe, have the wonderful Net adjoyned to the Carotidick Artery. In truth, this is met within ſo many, that common Anatomy hath aſcribed it to all Animals, and alſo to man it ſelf. In whom it is found, we obſerve, that the Artery, about to enter the Skull, is not carried about with ſo long a compaſs, but riſing up nigh the hinder part of the Turkiſh Chair, is preſently divided into ſmall ſhoots; yet ſo, as one little chanel is ſtretched right out, which the blood quietly running to, paſſes through without any ſtay, being carried ſtraight into the Brain: but from the ſide of this many rivulets are derived on every ſide, into which the blood impetuouſly aſcending, may be eaſily diverted. Theſe little rivers are partly ingrafted into the veinous paſſages of the ſame, and the Veſſels of the other ſide, and are partly carried into the pituitary Glandula, and partly a compaſs being fetched, are returned into the former chanel or belly of the Artery. That it is ſo, beſides naked inſpection, appears plainly by this Experiment. If below the Skull, an inky liquor be gently and by degrees injected into the Trunk of the *Carotis*, that paſſing through the ſtraight paſſage, is carried preſently into the Brain, nor does it dye the lateral infolded Veſſels with its tincture; but if this liquor be immitted continually and forcibly, preſently running into the folds, it will make black the Veſſels of the ſame and of the oppoſite ſide, alſo entring the hither part of the Glandula and its interior ſubſtance. If the uſe of theſe kind of infoldings of the Veſſels, or the wonderful Net be inquired into, I ſay, that it is made chiefly for theſe ends: *viz.* Firſt, that the Torrent of the blood being divided into ſmall rivulets, its more rapid courſe may be ſo far dull'd or broken, that it may be but leiſurely inſtilled into the Brain. For otherwiſe in laboring beaſts, who go with their hands hanging down, and have but a weak brain, the more free influx of the blood might eaſily overthrow the fabrick of the Brain, and ſpoil the animal Spirits. Secondly, the divarication of the *Carotides* into Net-like infoldings, hath another uſe of no leſs moment, to wit, that the more watry blood being (as it is its temperament in moſt Beaſts, and eſpecially in thoſe who are fed with herbage) before it be poured upon the Brain, might carry away ſome part of the ſuperfluous Serum to the pituitary Glandula, and inſtil the other part into the branches or ſhoots of the Veins to be returned towards the Heart. Thirdly and laſtly, for as much as the Veſſels on either ſide are mutually inoculated by this means, there is care taken both that the blood may be exactly mixed before it aſcends to the Brain, as alſo that more certain ways may be made for its paſſage: becauſe, if perchance an obſtruction ſhould happen in one ſide of the wonderful Net, the blood by that infolding being preſently

Fig. I.

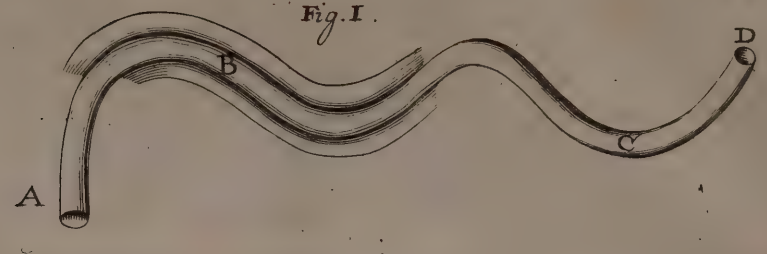


Fig. II.

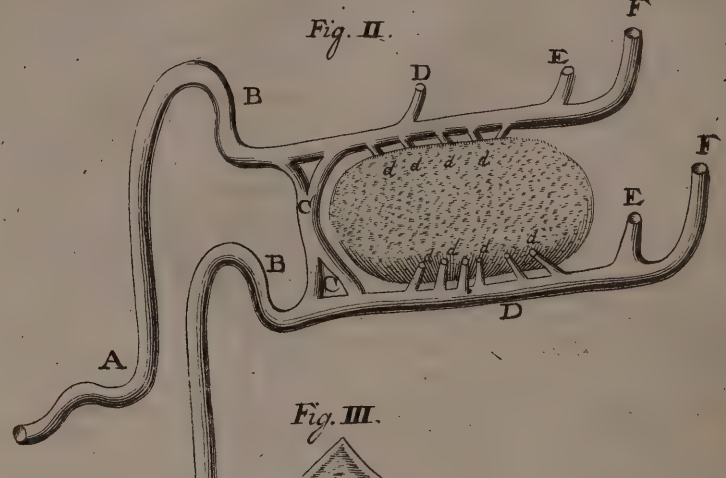


Fig. III.

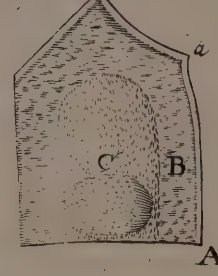
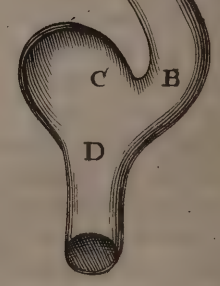


Fig. IIII.



preſently carried to the other, may find a paſſage: for this cauſe, to wit, that the blood might be the better prevented from any impediment in its paſſage, the Veſſels are not only inoculated under the *Dura Mater* about the wonderful Net, but the Arteries again on either ſide, do the ſame thing as ſoon as they being knit to the *Pia Mater*, reach the ſuperficies of the Brain, as hath been already ſhewn. By theſe ſort of ingraftings of the Veſſels in the wonderful Net, it comes to paſs, that an inky liquor being injected into one of the *Carotides*, and forced upwards, deſcends by the Trunk of the Artery on the oppoſite ſide, as we have elſewhere obſerved. Some rude draught of the wonderful Net is expreſſed in the third Figure of the following Table.

The Firſt Figure

Shews the aſcent of the Carotidick Artery, and its ſituation within an humane Skull, before it is carried towards the Brain.

A. *The Trunk of the Artery aſcending towards the Skull.*

BB. *The ſame, whilſt it is included in the bony Chanel, being clothed with an additional Coat.*

C. *The incurvature or bending of the Artery, reaching within the boſom of the Skull repreſenting the bending of a double S.*

D. *The Trunk of the ſame being carried towards the Brain.*

The Second Figure

Shews the aſcent of the Carotidick Arteries, and their ſituation in a Horſes Skull.

AA. *Either Carotidick Artery aſcending towards the Skull.*

BB. *The Trunk of either, having paſt the Skull, preſſed down as it were into a vally:*

CC. *The communications of either by croſs Branches.*

DD. *A Branch from either Trunk deſtinated for the* Dura Mater.

dddd. *Little ſhoots on either ſide ſent into the pituitary Glandula or* Kernel.

EE. FF. *Either Carotidick Artery being divided before it reaches the Brain, and aſcending with a double Trunk.*

The Third Figure

Shews the wonderful Net with the pituitary Kernel in a Calfs Skull.

A. a. *The direct Chanel of the Artery.*

B. *The Net-like Infoldings of the Veſſels ſtretched out by that Chanel towards the pituitary Kernel.*

C. *The pituitary Glandula or Kernel.*

The Fourth Figure

Shews after what manner the lateral Boſom goes into the Jugular Vein with a diverting place hanging to it.

A. *The lateral Boſom deſcending.*

B. *That Boſom ſliding into the Skull, and dilating it ſelf into a large and round Cavity, for the receiving of which there is a peculiar Den formed in the outward part of the Skull.*

C. *The aforeſaid Cavity or diverting place, in which the blood to deſcend, may go aſide, leſt it ſhould elſe ruſh too ſtrongly upon the Jugular Vein; by which alſo care is taken, that the blood may not flow back or regurgitate out of the Jugular Vein into to* Boſom.

D. *The beginning of the Jugular Vein.*

But as the *Carotides* (of whoſe office and aſcent we have hitherto ſpoken) carry the deſtinated Tribute of the blood to the Brain; ſo the Vertebrals ſerve chiefly for the watering the Cerebel and the hinder part of the oblong Marrow. Hence we obſerve, becauſe the conformation of the Cerebel is alike in Creatures, therefore alſo thè Vertebral Arteries, different from the *Carotides*, are found alike in all without any great difference. Nor does there ſeem to be need of any great proviſion for the admiſſion or entrance of the Vertebral Arteries within the Skull; becauſe, as they carry a leſſer portion of the blood, and for that the Blood it ſelf that is beſtowed on the Cerebel, is wont there to be agitated or moved with no perturbations of paſſions or conceptions; therefore there is not that neceſſity that there ſhould be placed any remora or any incitement for its Torrent.

The Vertebral Artery, ariſing from the branch in the fifth Rib, in its whole aſcent through the hinder part of the Head, paſſes through the little holes cut in the extuberances of the *Vertebræ*, till it comes near the Baſis of the hinder part of the Head; where the ſame being bent down on either ſide, and admitted into the Skull by the laſt hole, excepting where the ſpinal Marrow goes forth, is carried by the ſide of the oblong marrow; but as ſoon as it is brought to the region or the Cerebel, it ſends forth branches on either ſide, which cover its ſuperficies, and beſides on its back ſide make infoldings no leſs ſignal than

thoſe commonly called the *Choroeides*, and with larger Kernels more thickly interwoven. As *thoſe* ſhoots convey the Juyce requiſite for the ſtilling forth the animal Spirits, ſo *theſe* convey the heated blood and the purified from the ſerous Colluvies. Further, beneath the Cerebel, both the Vertebral branches, inclining mutually one to another, are united, as it were for that end, that if the flowing of the blood ſhould be ſtopped on either ſide, it might be ſupplied from the other to the whole compaſs of the Cerebel and its neighbouring parts. Theſe ſanguiferous Veſſels covering the Cerebel, even as the others do the Brain, make ſignal in foldings both in its outward ſuperficies, and in that of the oblong marrow, and alſo within its lappets and folds; from which ſmall ſhoots are ſent forth every where into its under-lying ſubſtance: ſo that from theſe a ſubtil liquor, as it were ſtilled forth and imbibed by the Cortical ſubſtance of the Cerebel, ſeems to go into animal Spirits. By what means, and in what parts of the Head the production of the animal Spirits is performed, remains next to be inquired into.

CHAP. IX.

Shews by what proviſion, and in what places of the Head the Animal Spirits are begotten: Alſo other Uſes and Accidents of the Pia Mater *are added.*

FRom the deſcription of the Sanguiducts or Blood-carrying Veſſels, which cover and weave about on every ſide the *Pia Mater*, hitherto handled, we are led by a certain thread to conſider by what proviſion, and in what places of the Brain and its Appendix the production of the animal Spirits is performed.

1. As to the firſt, it appears from what hath been already ſaid, that the blood is it ſelf the matter out of which the animal Spirits are drawn; and that the Veſſels containing and carrying it every where through the whole compaſs of the Head, are like diſtillatory Organs, which by circulating more exactly, and as it were ſubliming the blood, ſeparate its purer and more active particles from the reſt, and ſubtilize them, and at length inſinuate thoſe ſpiritualized into the Brain and its Appendix. Concerning this matter to be diſtilled, there is care taken, and indeed by the beſt means, that its ſtock or proviſion may be ſtill ſupplied in fit quality and due quantity.

In reſpect of the quality, from the whole bloody maſs, a portion highly volatile, ſpirituous, and endued with active Elements, ought conſtantly to ariſe towards the Head; which thing ſucceeds partly of its own accord, and partly that it might be more commodiouſly done, care is taken with a certain artificialneſs; to wit, the Vertebral Arteries, in all Creatures aſcending ſtraight, and almoſt perpendicularly, do in a manner cauſe, that only the more ſubtil and light blood is carried upwards, the remaining more thick as it were ſinking down for the baſer offices of the Limbs and of ſome of the Bowels. Yea, alſo the *Carotides* in a man, having an erected head higher than the reſt of the parts, and in a Horſe in ſome ſort lifting up his face, have alſo the ſame priviledge; to wit, that by their more ſteep aſcent only the more pure and volatile blood may aſcend to the region of the Brain. But in other four-footed beaſts, who go with a prone or hanging head, and who have a more frigid and watry blood, which may eaſily ſlide into, and too much waſh the Brain, this evil is in ſome part prevented by the wonderful Net and pituitary Glandula joyned to the *Carotides*; which indeed receive the ſuperfluous humidities of the blood, and and ſo make it more pure and free from dregs before it comes to the brain.

But that the blood may be ſupplied ſtill in due quantity, to wit, as it were in weight and meaſure, from the diſtillatory Veſſels, ſtretched about the compaſs of the Head, there is a notable proviſion made in all the *Carotides* about the Baſis of the Skull: becauſe their crooked imbowings and branching into infoldings, hinders the too great or too rapid approach of the blood: then, leſt the paſſage of it ſhould at any time be ſhut up, the mutual ingraftings of all the Veſſels on either ſide, do help or provide for. After this manner, the buſineſs of extracting the animal Spirits is performed even as a Chymical Elixir; to wit, great care is taken in the beginning of that Operation, both that choice of matter may be had, and that only a due proportion of it be expoſed to the diſtillation.

The blood by this means, as it were a Chymical work prepared, is carried by the fourfold Chariot of the Arteries to four diſtinct regions of the Head: and as the ſanguiferous Veſſels, being diſtributed with ſeparate ramifications or branches through the whole compaſs of the Brain and its Appendix, cover all the heights of its compaſſings about or gyrations, and alſo its crevices and their gapings and receſſes, they bring to their doors the matter to be diſtilled into the Head every where through the whole circumference of the Brain and Cerebel nigh the Cortical ſubſtance of either; out of which as the Spirits are diſtilled, by this means it is brought about, that they are inſinuated into the ſubjected ſubſtance of either. The blood being carried through the narrow infoldings and divarications of the Veſſels as it were (as was ſaid) through the ſerpentine chanels of an Alembick is made extremely ſubtile,

as much

as much as may be, in its liquor; in the mean time, what is bloody is received by the little ſhoots of the Veins aſſociates, or meeting one another every where, and what is ſerous by the Kernels every where diſperſed; yet its more purified and ſpirituous part being carried on further through the very ſmall ſhoots ſent forth on all ſides, are inſtilled more deeply into the very Pores and paſſages of the Brain and Cerebel; which preſently flowing from the Cortical ſubſtance into the medullary, there exerciſe the gifts of the animal Function. What peculiar body and conſtitutive particles of the Brain it ſelf and Cerebel conduce to the generation and perfection of the animal Spirits within the ſubſtance of either, ſhall be ſhewn hereafter, when we treat of the Uſe of thoſe Parts: now ſhall be taken notice of what we before mentioned, to wit, that the fluid extillation of the ſpirituous liquor from the blood about the *Pia Mater*, is performed after a ſignal manner, both from the ambient heat, which is ſtirred up from the blood contained within the boſoms, as it were from a *Balneo Mariæ*, inriched by the continual flowing of it anew, and alſo from the obduction of the Meninges, like an Alembick, by which the ſpirituous Particles, apt to fly away, are conſtrained and forced into the parts beneath.

But indeed, though the animal Spirits are procreated wholly from the blood, yet the blood watering the Brain and its Appendix, is not only beſtowed on this work: for as to the ſanguiferous Veſſels, which ariſing out of the Trunks both of the Carotides and the Vertebrals, cover over the whole Head and all its parts and proceſſes; though many of them, yet not all, are little diſtillatory chanels of the animal Spirits. For the animal Spirits are not produced in all places, to which theſe Veſſels reach; for we affirm, that theſe Spirits are only procreated in the Brain and Cerebel: (which it were eaſie to prove by the Symptoms which happen in the Apoplexy and Palſie, and ſhall be afterwards clearly ſhewn) and from this double fountain of the animal Spirits they flow out into all the reſt of the parts, and irradiate, by a conſtant influence, the whole nervous ſtock. In the mean time, the oblong marrow and its various proceſſes and protuberances are either retreating places, or high roads for the animal Spirits, procreated in the Brain and Cerebel, and flowing from thence. But for as much as the Arteries and Veins clothe theſe parts alſo with a thick ſeries of ſhoots, and that within the infolding of the Brain the folds called *Choroeides* are hung ſlack and looſly, theſe ſeen to be ſo made for other reaſons, *viz.* both that theſe parts might be actuated by heat, ſupplied as it were from a continual fire, and alſo that the nouriſhing Juyce might be beſtowed on the Spirits which flow there.

As to the firſt, that the animal Spirits now perfected, may be freely expanded, and irradiate the nervous *Syſtem*, there ſeems to be required, that the ambient heat, being excited by the blood flowing thither, might open all the little ſpaces for their paſſage, and notably dilate or lay open for them ways or roads: wherefore we intimated before, becauſe the little ſhoots of the Veſſels ought not to be deeply inſerted into calſous body, (for that, leſt the commerce of the Spirits, diverting in this Mart or meeting place, ſhould be diſturbed by the perpetual influence of the blood) therefore the infolding of the *Choroeides* is hung under its chamber, that at leaſt by this nigh ſituation, as by a Stove or Hot-Houſe, the heat there might be preſerved. Beſides, we intimated another uſe of this infolding; to wit, that the blood, paſſing through the very narrow *Meanders* and convolutions or rollings about of the Veſſels, might lay aſide its ſerous recrements into the Glandula's or paſſages of the Veins.

2. But ſecondly, That many branches and leſſer ſhoots of the ſame Veſſels, which water the Brain and Cerebel, cover alſo the oblong marrow, and in ſome meaſure enter into its Pores and deeper ſubſtance (within which the animal Spirits are not begotten, but only exerciſed and expanded) I ſay, that this is ſo made for this other reſpect; to wit, that the ſubſtance of the oblong marrow might imbibe a conſtant proviſion of nouriſhment from the pouring in of the blood whereof it hath need. For whilſt the animal Spirits, flowing into the nervous ſtock from the Brain and Cerebel, paſs through this paſſage, as it were the high road, ſome food here ought to be adminiſtred to them, as it were in their journey, from the watering blood: For indeed we ſuppoſe (which alſo will afterwards clearly appear) that the oblong marrow, together with the nervous parts, is moiſtned with a double humor, *viz.* one ſpirituous and highly active, which flows altogether from the Brain and Cerebel, and being from thence derived into the whole nervous ſtock, beſtows upon them the ſenſitive and moving Faculties; and the other humor ſofter and more oily and ſulphureous, which being ſupplied from the blood, and affuſed immediately on every part, is the Author of their Heat and Vegetation. Both theſe Juyces agree among themſelves, and being every where joyned together and married, they are as it were a maſculine and feminine ſeed mixed together; and ſo they impart to all parts both ſenſe and motion, and all the powers of life and growth. Wherefore it is obſerved, that all the parts of the whole body, by which motion and ſenſe are performed, do not only ſwell up with the animal Spirit, of whoſe influence being deprived, they preſently ſuffer a reſolution or looſning; but alſo they admit the ſanguiferous Veſſels; of whoſe Tribute if they be defrauded, preſently they wither away, or are diſtempered with a mortification or Gangrene. Wherefore, that the fleſh, membranes, and all the bones may be watered with the blood, (as may be perceived by the help of a Microſcope) the very little or minute bodies of ſome of the Nerves are ſurrounded with Capillaments or little hairs of Arteries and Veins, together with their proper Fibrils, that we need not doubt to aſſert, that the Veſſels penetrating the ſuperficies of the *Brain* and *Cerebel*, do diſtil into them a ſubtil matter for the generation of the animal Spirits; but that ſome other ſhoots of the ſame Veſſels, covering the oblong marrow, do only impart to it heat and nouriſhing Juyce. Laſtly, that the infoldings of the *Choroeides* were built under the chamber of the oblong marrow, chiefly for the diſpenſing of heat,

and in ſome meaſure for the ſake of ſeparation of the ſerous *Latex*. But concerning theſe, we ſhall haveoccaſion to ſpeak more largely afterwards, when we ſhall treat of the nutritious and nervous Juyce, and when we ſhall conſider of that famous Controverſie, *viz.* whether nouriſhment is made by the blood or Nerves: further, we ſhall elſewere ſpeak more fully of the Nature, Hypoſtaſis, and diverſe Diſpoſition of the animal Spirits; alſo, what the ſubſtance of the Brain, and the conformation of the parts, may contribute to their production.

Thus far concerning the *Pia Mater* and the blood-carrying Veſſels, which are woven in it, and following its protenſion, water the whole Head, we have treated largely. But before we quite leave the conſideration of this Membrane, we will inquire what ſenſe and motion it may have. Certainly it is not undeſervedly that we aſcribe the moſt cruel Head-aches to the more acute ſenſe of this; (in which however, by what means this Meninx is affected, does not ſo eaſily appear.) It is the common opinion, that ſharp and tormenting Vapours, being raiſed from the Viſcera of the lower Belly, eſpecially from the Ventricle, Hypochondria, or Womb ſtrike againſt this Membrane, and ſo pierce it with a pain. But we ſay, though this be impoſſible, that Vapours paſſing ſo many interſtices and bars of the Viſcera and bones, without any trouble, ſhould ever come to the Head and hurt it: yet we do not deny, but that ſometimes vaporous Effluvia's do proceed from the blood boiling or eſtuating within the confines of the Brain, which being ſhut up together under the *Pia Mater*, and as it were gathered into a Cloud, do greatly blow up and diſtend it, and ſo diſtemper it with pain. I have often ſeen, in a Head newly opened after death, the *Pia Mater* diſtended, and ſhining like a Bladder, that the ſame ſeemed to be intumified, with much water included under it; which notwithſtanding was found to be ſo done by wind diſtending the Membrane, for that being diſſected, that Tumor fell down without the effuſion of water.

But we think the Head-aches, which happen by reaſon of the evil of this Membrane, are chiefly excited by another means, to wit, for as much as this Meninx ſuffers a breach of the unity by the blood boiling up above meaſure, and ruſhing into its Pores, and ſo it is contracted into lighter Convulſions. I have ſometimes opened the Heads of the defunct, which when living, were obnoxious to moſt miſerable Head-aches; in which, near the longitudinal boſom, where the ſeat of pains was, the *Pia Mater* or interior, grew to the *Dura Mater* or exterior for ſome ſpace, oft-times for two fingers breadth, and by their growing together had excited a ſharp and unequal Tumor; in which the mouths of the Veſſels were ſo wholly ſtopped up, that there was left for the blood, though very much boiling up, no paſſage into the adjoyning boſom.

As to the motion of this Membrane, we wholly deny, that it hath in it ſelf a perpetual Syſtole and Diaſtole; however, the Pulſes in ſome Arteries, have ſeemed ſomething like it, which have given occaſion perchance to this vulgar Opinion. Yet in the mean time, it may be lawful to believe, that this Meninx, for that it is very ſenſible, is rendred obnoxious to Cramps and convulſive motions: and from its greater contraction the fits of the Falling-ſickneſs do ariſe, and from its leſſer and more partial corrugation or wrinkling together, Head-aches, as hath been ſaid, and alſo ſometimes Scotomies, Vertigoes, and often Convulſions of the Members and Viſcera, planted at a great diſtance from the origine of the Nerves, being drawn into conſent.

CHAP. X.

A Deſcription of the Brain, properly ſo called, and the Explication and Uſe of its Parts.

WE have thus far beheld the Coverings of the Brain, both the bony and the membranous, alſo the Arteries and Veins growing and knit to them, like Ivy, and diſtributed through the whole compaſs of the Head. There now remains, theſe coverings being removed, that we next conſider the Fabrick and true Hypotype or Character of the Brain and its Appendix, together with the action and uſe of all the parts. And here at firſt ſight we meet with three things, to wit, the Brain, the oblong Marrow, and Cerebel: of which the oblong marrow ſeems to be a common Trunk, to which the Brain and Cerebel grow like branches: wherefore ſome contend the medullary Rope to be the principal part, and the Brain and Cerebel its dependences. But that it is otherwiſe appears by this, becauſe theſe bodies, both in the generation and diſpenſation of the animal Spirits, are of more noble uſe than the oblong marrow; ſo that if the out-flowings of the Spirits from the Brain or Cerebel be ſhut up or hindred, the nervous Syſtem preſently ſuffers an Eclipſe; in the mean time, if this be primarily diſtempered, the Brain and Cerebel ſuffer not for its fault.

That

That we may begin with the Brain, it may be conſidered in a double reſpect; to wit, both as to its convex or exterior ſuperficies, as it is beheld in its proper ſite and poſition; and as to its interior cavity, to wit, as the Brain appears opened, its concave ſuperficies being expanded and turned upſide down. We have already taken care to delineate its true form or Type in either manner, by what hath been before ſaid, to wit, after what manner it is both within and without. There now remains, after its fabrick and conformation being rightly weighed, for us to deſign its offices, and to ſhew the uſes of it and of every one of its parts. Concerning which, we ought to unfold in general, firſt, what the office of the whole Brain is; then ſecondly, when we ſhall deſcend to particulars, there will come under conſideration, 1. The diviſion of the Brain, to wit, its double Hemiſphere, alſo the two Lobes or partitions of either. 2. The narrow crankling turnings and windings, or the gyrations and convolutious or rolling together of the Brain. 3. Its double ſubſtance, *viz.* Cortical and Medullary. 4. The common Baſis of all, *viz.* the callous body. 5. Its ſubtenſion or *Fornix*. 6. The appenſion or circuit of the Brain over or above the oblong marrow. 7. And what reſults from thence, the void ſpace or Ventricles made by its infolding together. Concerning theſe, we ſhall take notice of what things occur worth noting; concerning the ſmelling Nerves and their proceſſes, we ſhall inquire afterwards, when we ſhall ſpeak particularly of the Nerves.

1. The Brain is accounted the chief ſeat of the Rational Soul in a man, and of the ſenſitive in brute beaſts, and indeed as the chief mover in the animal Machine, it is the origine and fountain of all motions and conceptions. But ſome Functions do chiefly and more immediately belong to the ſubſtance of this, and others depend as it were mediately and leſs neceſſarily upon it. Among theſe, which of the former ſort are accounted the chief, are the Imagination, Memory, and Appetite. For it ſeems, that the Imagination is a certain undulation or wavering of the animal Spirits, begun more inwardly in the middle of the Brain, and expanded or ſtretched out from thence on every ſide towards its circumference: on the contrary, the act of the Memory conſiſts in the regurgitation or flowing back of the Spirits from the exterior compaſs of the Brain towards its middle. The Appetite is ſtirred up, for that the animal Spirits, being ſome-how moved about the middle of the Brain, tend from thence outwardly towards the nervous Syſtem. The reſt of the Faculties of this Soul, as Senſe and Motion, alſo the Paſſions and Inſtincts merely natural, though they depend in ſome meaſure upon the Brain, yet they are properly performed in the oblong Marrow and Cerebel, or proceed from them.

2. In ſome Animals, the ſubſtance of the Brain is divided into two parts, as it were Hemiſpheres, diſtinct one from another almoſt through its whole thickneſs, even to the callous body, which is inſtead of a bottom; and in like manner alſo in all the Senſories, and in moſt of the other Organs of the neceſſary Functions, the Brain is as it were twofold, that there might be a proviſion made againſt the defect of one ſide by the ſupplement of the other. Further, in man, who hath a brain more large and capacious than other Creatures, either Hemiſphere is again ſubdivided into two Lobes, to wit, the Anterior and the Poſterior; between which a branch of the Corotidick Artery, being drawn like a bounding River to both, diſtinguiſhes them as it were into two Provinces. Certainly, this ſecond partition of the humane Brain alſo ſeems to be deſigned for its greater ſafety; that if perchance any evil ſhould happen to one or both the foremoſt Lobes, yet the latter, for that they are ſeparated, may avoid the contagion of the neighbouring and farther ſpreading evil: So the Brain, like a Caſtle, divided into many Towers or places of Defence, is thereby made the ſtronger and harder to be taken.

3. Alſo the univerſal frame of the Brain appears yet more divided and variegated within all its aforeſaid partitions; for all its whole exterior ſuperfices is made uneven and broken, with turnings and windings and rollings about, almoſt like thoſe of the Inteſtines. Thoſe Gyrations or Turnings going from the fore-part of the Brain towards the latter with a creeping compaſs, and as it were a ſpiral circuit, encompaſſes both its Hemiſpheres, that they mighty mutually furniſh all the convolutions with a continued paſſage: in a more moiſt Brain, or long kept, the *Pia Mater*, clothing every one, and collecting them together, is eaſily pulled away; and then the turnings or folds being opened and ſeparated one from another, the ſubſtance of the brain is ſeen to be plowed, or laid as it were with furrows; out of which ariſe banks or ridges of broken crevices, not in a direct ſeries, but croſs-wiſe; ſo that the bottom of every furrow, a convultion ariſing from the right ſide, is carried to the left; then others following next, being ſent from the left ſide, is drawn to the right, and ſo by turns the inequalities of the whole brain are variegated in this order.

If it be inquired into, what benefit its Turnings and Convolutions afford to the brain, or for what end its whole anfractuous or broken crankling frame is, we ſay that the brain is ſo framed, both for the more plentiful reception of the ſpirituous aliment, and alſo for the more commodious diſpenſation of the animal Spirits for ſome uſes. As to the aliment to be beſtowed on the brain, becauſe it is required to be ſubtil and extremely wrought or elaborated; therefore it ought to be admitted, not by a more open paſſage, but only by very ſmall pores and paſſages. Wherefore that there might be ſufficient plenty of ſpirituous liquor ſupplied, it is not only drunk in every where in the plain ſuperficies of the brain from its Cortical ſubſtance; but that ſuperficies of the brain or Cortical ſubſtance is uneven and rough with folds and turnings about; that the ſpaces for the receiving the Juyce might be enlarged as much as may be: For the anfractuous or crankling brain, like a plot of ground, planted every where with nooks and corners, and dauks and mole hills, hath a far more ample extenſion, than if its ſuperficies were plain and even

Further

Further, thoſe cranklings of the brain do more fitly hide the ſanguiferous Veſſels, for that they are very ſmall and ſlender, and more ſafely keep them, being variouſly interwoven into one anothers infoldings, than if they ſhould be openly diſtributed; for ſo being careleſly laid, they would be liable to too frequent hurt.

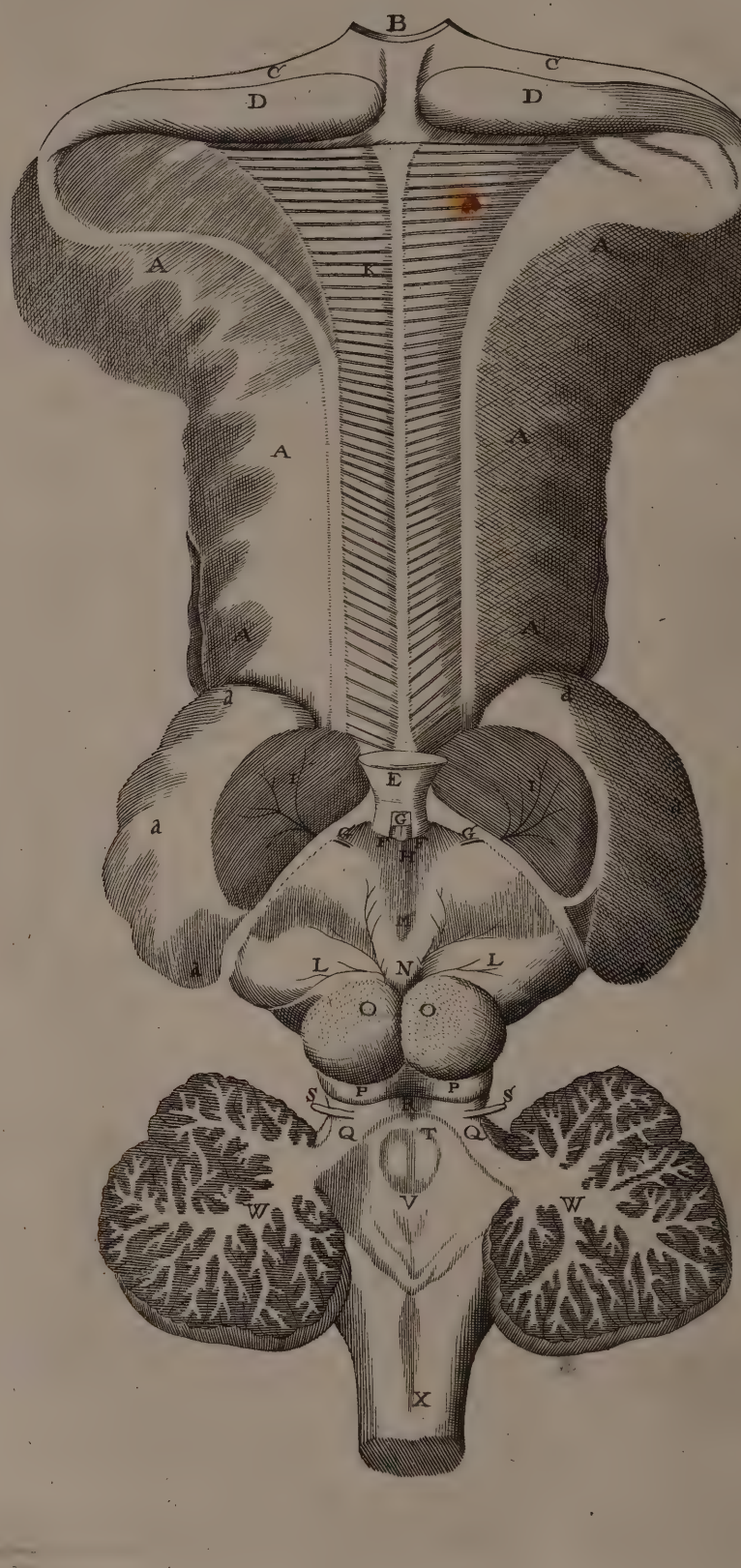
But a reaſon and neceſſity of the turnings about the brain, and not of leſſer moment than the other, is fetched from the diſpenſation of the animal Spirits. For as the animal Spirits, for the various acts of Imagination and Memory, ought to be moved within certain and diſtinct limited or bounded places, and thoſe motions to be often iterated or repeated through the ſame tracts or paths: for that reaſon, theſe manifold convolutions and infoldings of the brain are required for theſe divers manners of ordinations of the animal Spirits, to wit, that in theſe Cells or Store-houſes ſeverally placed, might be kept the ſpecies of ſenſible things, and as occaſion ſerves, may be taken from thence. Hence theſe folds or rollings about are far more and greater in a man than in any other living Creature, to wit, for the various and manifold actings of the ſuperior Faculties; but they are garniſhed with an uncertain, and as it were fortuitous ſeries, that the exerciſes of the animal Function might be free and changeable, and not determined to one. Thoſe Gyrations or Turnings about in four footed beaſts are fewer, and in ſome, as in a Cat, they are found to be in a certain figure and order: wherefore this Brute thinks on, or remembers ſcarce any thing but what the inſtincts and needs of Nature ſuggeſt. In the leſſer four-footed beaſts, alſo in Fowls and Fiſhes, the ſuperficies of the brain being plain and even, wants all cranklings and turnings about: wherefore theſe ſort of Animals comprehend or learn by imitation fewer things, and thoſe almoſt only of one kind; for that in ſuch, diſtinct Cells, and parted one from another, are wanting, in which the divers Species and Ideas of things are kept apart.

But that in more perfect Animals, all the turnings about are made of a twofold ſubſtance, *viz.* Cortical and Medullary: the reaſon ſeems to be, that one part may ſerve for the production of the animal Spirits, and the other for their exerciſe and diſpenſation. For we may well think, that the animal Spirits are wholly or for the moſt part procreated in the Cortical ſubſtance of the brain; for this ſevers and receives immediately from the blood the ſubtil liquor, and imbuing it with a volatile Salt, exalts it into very pure Spirits. It is obvious to every one, that the Arteries enter the *Cortex* of the brain with a more frequent inſertion of ſhoots, and inſtil to it a ſpirituous liquor; the leavings of which, or what is ſuperfluous, the Veins in like manner entring it, do ſup up and carry away; in the mean time, the more ſubtil portion being here ſet free, goes into Spirits. In truth, the blood waters the medullary ſubſtance of the brain in a very ſmall quantity; which ſeems truly to be rather for the ſake of exciting of heat, than that the animal Spirits ſhould there be generated by the flowing in of that blood. For indeed, the volatile Salt, which like Ferment, ſpiritualizes the ſubtil liquor ſtilled forth from the blood, is had more copoiuſly in the *Cortex* of the brain, rather than in its mdidle or marrowy part; becauſe that part being endued with an Aſhy colour, ſhews by its aſpect the ſpermatick Particles and Humor contained in them, in which Spirit and a volatile Salt very much abounds; yea and plainly reſembles on Armeniack ſmell, (ſuch as either part alike breathe forth.) In the mean time, the medullary part of the brain ſeems very like the oblong marrow and the ſpinal. But it is well enough known, that theſe medullary parts ſerve for the exerciſe and diſpenſation of the animal Spirits, and not for their generation. The ſign of which is, that where-ever an obſtruction happens in them, whatever is below, being deſtitute of the influx of the Spirits, ſuffers an Eclipſe; whence it follows, that the animal Spirits, irradiating the medullary Rope, are not produced in it, but flow in from elſewhere; and why ſhould we not think the ſame of the middle marrow of the brain? Truly, that this part is rather the Mart or Exchange of the Spirits than its Shop or Work-houſe, appears from hence, becauſe the Animals which excel in Memory, Imagination, and Appetite, are furniſhed with a more ample marrow of the brain; as is obſerved in man and the more perfect four footed beaſts: and they who ſeem to have little need of thoſe Faculties, as the leſſer four-footed beaſts, alſo Fowls and Fiſhes have the *Cortex* of the brain greater, but the medullary part very ſmall. It is a familiar Experiment among Boys to thruſt a needle through the head of a Hen, and that ſhe in the mean time, whoſe brain is ſo pierced through, ſhall live and be well a long time. The reaſon of which is, becauſe the whole ſubſtance of the brain in theſe ſort of Animals is almoſt merely Cortical; wherefore from the ſuffering ſuch a hurt, (as long as the marrow remains unhurt) the Spirits are generated in a leſſer quantity, but their commerce to the neceſſaries of life, are not therefore preſently interrupted. Indeed the brains of Birds conſiſt almoſt wholly of a Cortical and Aſhy part; and the medullary part is exceeding ſmall, and is only like a ſmaller Nerve deſcending on either ſide from the ſubſtance of the brain it ſelf.

After the animal Spirits are begot by a conſtant afflux of the blood within the *Cortex* of the Brain, being there begotten, having obtained a watry Vehicle, they flow preſently more inwardly, and ſoon enter into the marrows, filling the furrows and baulks of all the turning and winding Crevices; from whence being carried farther through all the particular tracts of each marrow into the marrowy ſubſtance, which lyes under all the winding Crevices, as their common Baſis, they are brought at laſt into the *Callous Body*, as into a ſpacious field; where, as in a free and open place, theſe Spirits being newly produced, are expatiated or iſſue forth.

5. Indeed

Fig. VII.



5. Indeed this medullary ſubſtance called the *Callous Body*, which chambering the more inward ſuperficies of the brain, receives into it ſelf the marrow of all the turning Crevices, ſeems to be made for that end, and diſpoſed there for the ſame purpoſe; to wit, that the Spirits flowing into it on every ſide, might be ſtretched out as in their proper Sphere, and begin to exerciſe the acts of the animal Faculties. In this place, they which come out of the ſeveral winding Crevices, do meet together, and remain as in a publick *Emporium* or Mart; from whence, as occaſion ſerves, they are raiſed up, and drawn forth for the uſes of every Faculty. But whilſt they here remain at leiſure and not buſied, they become purified or refined more and more by a continual circulation: becauſe theſe Spirits new-born, do gently and perpetually flow on every ſide from the outmoſt bounds of this body (to wit, where this common marrow beſmears the hinder productions of the brain, or the border of either of its Hemiſpheres) towards the forepart of this *callous Body*, where it is thickeſt; and there, if there be need, they are employed on the act of the Imagination, or entring the ſhanks of the *oblong Marrow*, they actuate and inſpire the nervous *Appendix*: but what Spirits are remaining there, after theſe offices are ſerved, run forthwith into the *Fornix*, and paſſing through its paſſage, they are remanded back again to the hinder region of the brain by a certain circulation; and laſtly, after this manner, penetrating through the narrow paſſages of the *Fornix*, thoſe Spirits are made more ſubtil, and alſo, as it ſeems moſt likely, they perfom in this circulary motion thoſe more ſubtil acts of the Phantaſie.

6. Truly, that we may here ſpeak ſomething of the *Fornix*, it ſeems that this part ſerves for a towfold uſe: *viz.* firſt, leſt more inward ſides of the Brain hanging ſlack and looſly, might fall together among themſelves, or might be removed beyond the limits of a juſt protenſion or out-ſtretching; for they not only by the coming between of the *Pia Mater*, and by little cords drawn from it, cohere to the oblong marrow and the Cerebel; but beſides, the *Fornix*, like a Ligament or ſtring brought from one end of the brain to the other, conſtrains and keeps its whole frame in its due figure and ſituation. For this part purely medullar, and of the ſame ſubſtance with the callous Body, ſeems to be a certain proceſs of this, which ariſing more forward between the ſtreaked bodies, and falling upon the two ſhanks of the oblong marrow, firſt of all diſtinguiſhes them: afterwards, being ſeparated from them, is carried through the midſt of the cavity, and about the hinder part of the brain is divided as it were into two Arms, which being bent on both ſides, and again cleaving to the border of the *callous Body*, ſtrictly embrace the oblong marrow, and knit and firmly tye the hinder bulk of the brain to its Trunk, leſt it ſhould flow or ſlide forth. But the other, and that the more noted uſe of the *Fornix* ſeems to be what we but now mentioned; to wit, that the animal Spirits may immediately paſs through its paſſage from one end of the brain to the other, and ſo, as it were through the bill of a *Pelican*, they might be circulated into their own intorted belly.

That thoſe things were but now declared concerning the *Penetralia* and inward receſſes of the Brain, may be the better underſtood, we will here add a Scheme of its Sphere turned inſide out, and ſtretched out as it were upon a plain, ſo that the concave and inmoſt ſuperficies of the *callous Body*, together with the *Fornix*, may be ſufficiently ſeen.

The Seventh Figure

SHews the Brain of a Sheep bent back and cut a little open in the places where they ſtick together near the ſtreaked bodies, that its interior ſubſtance may be turned the inſide out, and unfolded on a plain.

AA. *The ſubſtance of the Brain cut aſunder, which in its natural ſituation being folded together, did cohere with the reſt of its ſubſtance* a. a. *upon the remaining ſtreaked Bodies.*

B. *The Trunk of the* Fornix *or* Pſalloides *cut aſunder, which in its natural ſite coheres with the Baſis of the ſame* Fornix E.

CC. *The Arms of the* Fornix *which embrace the medullary Trunk on the other ſide of the Pineal Glandula.*

DD. *The brim of the callous Body which embraces the medullary Trunk near the Cerebel.*

E. *The Baſis of the* Fornix.

FF. *Two ſtraight Roots of the* Fornix *lying between the ſtreaked Bodies.*

GG. *The tranſverſe medullary Proceſs knitting the two ſtreaked Bodies one to another.*

H. *The Chink near the Roots of the* Fornix *leading to the Tunnel.*

I. *The ſtreaked Bodies, whoſe Superficies the ſmall Arteries and Veins cover over.*

KK. *The interior Superficies of the callous Body marked with tranſverſe medullary ſtreaks or chamferatiugs, or reaching from one Hemiſphere of the Brain to the other.*

LL. *The Chambers or hollow places of the Optick Nerves.*

M. *The anterior hole leading to the Ventricle lying under the orbicular Protuberances, which alſo goes ſlope-wiſe to the Tunnel.*

N. *The Pineal Glandula which appears more plain, the* Pia Mater *and the Choroeidal infolding being ſeparated and removed*

OO. *The Natiform or Buttock like Protuberances, which are here far greater than in a Man or Dog.*

PP. *The leſſer Protuberances called* Teſtes, *which are additions or things growing out of the former.*

QQ. *The*

QQ. *The medullary Proceſſes ſtretching from the* Teſtes *into the middle or marrowy part of the Cerebel.*
R. *The meeting together of thoſe Proceſſes.*
SS. *The Pathetick Nerves of the Eyes ariſing out of the meeting together of thoſe Proceſſes.*
T. *The poſterior hole leading into the Ventricle, lying under the orbicular Protuberances, and alſo into the ſame opening of the Tunnel.*
V. *A Furrow in the medullary Trunk, which being covered by the Cerebel, makes the fourth Ventricle.*
WW. *The Ramifications or Branchings of the medullary ſubſtance of the Cerebel, which appear like a Tree.*
X. *The end of the oblong Marrow about to go into the Spinal.*

CHAP. XI.

Shews with what motion and tendency of the Animal Spirits, the Exerciſes of the Animal Faculties are performed within the Confines of the Brain: Alſo what the uſe of its Ventricles is.

HItherto ſetting forth the uſes and offices of the Brain, properly ſo called, and of its parts, we have ſhewed after what manner the animal Spirits are procreated from the blood in this their principal Shop or Work-houſe; and into what diverting places, they being newly brought forth, do depart of themſelves, and are there kept as it were in diſtinct Cloiſters or Cells to be drawn forth for the manifold Exerciſes of the animal Function. But becauſe theſe Spirits, ſo brought to perfection, and ready for their work within the ſame parts of the Brain, enter into other manner of motions, and divers ways of emanations; therefore before we proceed any further, for the ſearching out their tracts within the oblong Marrow and Cerebel, we ought to declare concerning theſe Spirits diſpoſed within the confines of the Brain it ſelf, with what forces they are furniſhed, in what form they unfold themſelves, and in what ways they diffuſe themſelves and go forward as often as being muſtered in due order, they produce the acts of the Imagination, Memory, Appetite, and other ſuperior Faculties of the Soul. But for as much as hereafter, when we have finiſhed the explication of the Head and nervous Appendix, we have reſolved, for a concluſion, to treat of the Soul of Brutes and its powers, I may therefore for the preſent lay aſide this task; unleſs that in the mean time it may not ſeem amiſs to give a taſte only in general of theſe few things: *viz.* as there are two parts of the inferior Soul, or of Beaſts, to wit, the vital or flamy, being inkindled in the blood, and the ſenſitive or lucid, being diffuſed through the whole Head and its nervous dependences, the animal Spirits being continually produced in the Brain and in the Cerebel, do conſtitute a double as it were Root or Fountain of this lucid part: yea, the Spirits of either linage, for as much as they are continued both within thoſe Fountains, and from thence through the frame or ſubſtance of the nervous Syſtem, as it were under the ſame beamy *Syſtaſis* and contexture, they effect or cauſe the whole *Hypoſtaſis* or ſubſiſtency of the ſenſitive Soul.

But there happen to this Soul, becauſe it is apt to be moved with a various impulſe, and ſo to contract or dilate its ſpecies in the whole, or in part, for that reaſon divers manners both of Actions and of Paſſions, to wit, the Senſes, which we call its Paſſions; and Motions, which we name the Actions of the ſame. The formal reaſon of the former, *viz.* the Senſes, conſiſts in the retraction or drawing back of the Spirits, or a flowing back towards their Fountains. For where-ever the impreſſion of a ſenſible object is carried to this radiant or beamy contexture, preſently either the whole frame, or ſome portion of it, whereby it admits the ſpecies, is compelled to wag, and to be moved back, as it were to leap back and recede into it ſelf: on the contrary, the actions or motions of this Soul are made, for that this ſhadowy Spirit, being incited or ſtirred up in the whole, or in a certain part, unfolds it ſelf more largely, and by an emanation, and as it were a certain vibration of the Spirits, exerts or puts forth its virtue and force of acting.

Both the Senſes and Motions of this ſenſitive Soul are made either tranſient, when the Spirits, or its conſtitutive Particles, being moved ſomewhere in the Syſtem of the Nerves, draw together with them the containing parts, and deflect them with the like carriage or geſture with themſelves, as is obſerved in the five outward Senſes, and the local motions of the Members: or elſe, either both Actions and Paſſions are continuing, to wit, when both the Motions and Senſes are ſilently performed without any great agitation or moving of the body, or its parts, within the firſt Fountains of the Soul, *viz.* the Head it ſelf. Theſe kind of Paſſions indeed, made within the ſubſtance of the Brain, are the common Senſe and Imagination; but the Actions are Memory, Phantaſie, and Appetite: and either of theſe, as to their beginnings and inſtincts, depend for the moſt part upon the outward Senſes.

Concerning

Concerning the former, we take notice, that as often as the exterior part of the Soul being ſtruck, a ſenſible impreſſion, as it were the Optick Species, or as an undulation or waving of waters, is carried more inward, bending towards the chamfered bodies, a perception or inward ſenſe of the Senſation outwardly had or received, ariſes. If that this impreſſion, being carried farther, paſſes through the *callous Body*, Imagination follows the Senſe: Then if the ſame fluctuation of Spirits is ſtruck againſt the *Cortex* of the Brain, as its utmoſt banks, it impreſſes on it the image or character of the ſenſible Object, which, when it is afterwards reflected or bent back, raiſes up the memory of the ſame thing.

The active Powers of this Soul, *viz.* Local Motion, Memory, Phantaſie, and Appetite follow ſometimes immediately the Paſſions, ſometimes are induced apart from them upon other occaſions. For indeed the ſenſible impreſſion ſtriking the ſtreaked or chamfered bodies, oftentimes, the Brain being in no wiſe affected, cauſes the local Motions to be retorted with a reciprocal tendency of the animal Spirits; ſo in ſleep (the Appetite knowing nothing of it) when pain troubles, preſently we rub the place, moving the hand to it: but more often, after that the ſenſible Species, having paſt from the common Senſory to the *callous body*, hath ſtirred up the Imagination, the Spirits, reflecting from thence, and flowing back towards the nervous Appendix, raiſe up the Appetite and Local Motions, the Executors or Performers of the ſame: And ſometimes a certain ſenſible impreſſion, being carried beyond the *callous Body*, and ſtriking againſt the *Cortex* of the Brain it ſelf, raiſes up other Species lying hid there, and ſo induces Memory with Phantaſie, alſo often with Appetite and Local Motion aſſociates. Further, theſe active Powers, ſometimes upon other occaſions, are wont to be ſtirred up and exerciſed apart from Paſſion. In Man, the Rational Soul variouſly moves the ſenſitive, and at its pleaſure draws forth and brings into act its Powers, ſometimes theſe, ſometimes thoſe. Moreover, the blood boiling up above meaſure, and by that means ſtriking impetuouſly the border of the Brain, excites the ſpecies of things lurking in it, and driving them forward towards the middle or marrowy part of the Brain, cauſes alſo the various Acts of the Phantaſie and Memory to be repreſented.

Concerning the aforeſaid interior or abiding Faculties, we ſhall at preſent further take notice, that their more perfect Exerciſes are chiefly and almoſt only performed by the Spirits already perfected and highly elaborated; for thoſe a making, or that are new made, being numerous, they very much obſtruct and hinder the acts of the animal Function: to wit, when from the Veſſels, on every ſide watering the *Cortex* of the Brain, the ſubtil Liquor is plentifully inſtilled for the matter of the Animal Spirits, this flowing inwardly ſtuffs all the pores and paſſages of the Brain, and ſo excludes for that time the Spirits from their wonted tracts and orbs of expanſion. Wherefore whilſt the chief reflection of the Brain and Spirits is celebrated, ſleep, or an Eclipſe of the animal Spirits happens; then waking returns, when from the Liquor inſtilleds the more ſubtil part is exalted into very pure Spirits, and at length the more watry, being partly reſolved into Vapours, is exhaled, and partly ſupped up by the paſſages of the Veins entring the ſubſtance of the Brain, or elſe is ſweat out into the vacuity lying under the *callous Body*. Concerning theſe I hope we may diſcourſe more largely afterwards. In the mean time, that we may proceed to the reſt of the things propoſed, concerning the frame of the Brain, properly ſo called, there yet remains that we ſpeak of its Ventricles: But ſince they are only a vacuity reſulting from the folding up of its exterior border, I ſee no reaſon we have to diſcourſe much of their office, no more than Aſtronomers are wont of the empty ſpace contained within the vacuity of the Sphere.

But in truth, as there is nothing met with in Nature that is not deſtinated to ſome uſe, ſurely we ſuſpect this ſame *Vacuum* or empty ſpace not to be built in vain within the Globe of the Brain. The Ancients have ſo magnified this Cavern, that they affirmed it the Shop of the Animal Spirits, both where they themſelves were procreated, and performed the chief works of the animal Functiou. But on the other ſide, the Moderns or thoſe of later days have eſteemed theſe places ſo vile, that they have affirmed the ſame to be mere ſinks for the carrying out the excrementitious matter. But indeed that opinion of the Ancients is eaſily overthrown, for that the animal Spirits, being very ſubtil, and apt to fly away, require not ſuch large and open ſpaces, rather than the more narrow paſſages and little pores, ſuch as are made in the ſubſtance of the Brain: for theſe Spirits (becauſe they ought, for the various Faculties of the Soul, to be compoſed into various ſeries, and divers orders and diſpoſitions, therefore) ought to be moved within peculiar orbs and tracts Further, if any one ſhall exactly conſider the fabrick of the Brain, and ſeriouſly weigh, that theſe Ventricles are not formed out of the primary intention of Nature, but reſult only ſecondarily and accidentally from the complication of the Brain, he will be far from thinking, that the ſupreme ſeat of the Soul is fixed there, where being hem'd in with a moſt noble Guard of Spirits, it doth execute and perform its Functions. For it neither appears at all out of what matter, and by what artifice the Spirits are there begotten, nor by what ways of emanation they are derived from thence into the other parts of the Brain and nervous Syſtem. Wherefore almoſt all Anatomiſts, who are of a later Age, have attributed that vile office of a Jakes or ſink to this more inward chamber of the Brain. To which Opinion there has been ſome truſt given, for that theſe Ventricles are often ſeen in the dead to be filled with water; alſo from theſe, ways ſeem to lye open for excretion, both towards the Tunnel, and alſo into the Sieve-like Bone. It is obſerved, that where-ever the blood flows more copiouſly into any part, and waters it, there Vapors or watry Humors are begotten from the ſuperfluous Serum left in the circulation, which for the moſt part either exhale out through vaporous *Effluvia's*, or are brought back into the blood by the Veins or Lymphatick Veſſels. But when the blood, by a plentiful influx, waters not only the *Cortex* of the Brain, but

the interior marrow alſo, it remains, that the ſerous *Latex* (when-ever it abounds more in the blood, than that its ſuperfluities may be reduced immediately by the Veins, or by the Lymphæducts, if they be there, or may be ſeparated by the Glandula's) ſhould ſlide down into this den, made hollow within the infolding of the Brain. Truly there are many inſtances, which plainly evince, that the ſerous humors are ordinarily laid up in the Ventricles of the Brain. Anatomical Obſervations of men dying of many Cephalick diſeaſes, and eſpecially of ſoporiferous or ſleepy diſtempers, confirm this. Yea, it may be lawfully thought, that natural ſleep follows, for that the Pores and paſſages of the Brain are occupied and ſtuffed with a watry *Latex*, which ſerves for a Vehicle to the Spirits. Then as often as a profound ſleep invades any one from a Surfeit, or drinking of Wine, the cauſe is, that the little ſpaces in the medullary ſubſtance of the Brain, deſtinated for the motions of the Spirits, are too much obſtructed by a Narcotick or a watry humor: certain reliques of which, being reſolved into vapor, and thruſt out from the company of the Spirits, do often ſweat out, or drop into this *Vacuum* or empty ſpace.

After this manner, it may be believed concerning the Ventricles of the Brain, or the empty ſpace left within its plicature or folding together. But in truth, becauſe this matter hath been very much controverted among Phyſicians of every Age, and the right deciſion of it ſeems to be of great moment, for the explicating the offices of the other parts of the Head; I will here compare together the reaſons for and againſt this Opinion, that we may at length give our Judgment of this Opinion, what may be either true, or moſt likely.

CHAP. XII.

It is inquired into, whether the ſerous Humors, heaped together within the Vacuity of the Brain, be ſent out by the Pituitary Glandula and the Sieve-like Bone, or not?

SInce Experience teſtifies, that the Serum and excrementitious, I may juſtly ſay morbifick, and oftentimes deadly Humors, are found frequently within theſe Ventricles of the Brain; we ought to enquire more diligently concerning their paſſage in and out: and the rather, for that it is very much doubted by ſome concerning the uſe of theſe Dens, nor are there wanting thoſe in this late Age, who have endeavoured to bring into vogue the ancient Opinion, though long ſince exploded, concerning the Spirits being begot in this place, and here exerciſed. I believe without doubting, for the reaſons before alledged, that the Spirits are not here begotten, nor exerciſed: and no leſs certain is it made by Experience, that the ſerous Colluvies is here often gathered together. This therefore only remains, that we ſhould ſee from whence, and how this flows hither, and then by what ways of Excretion the ſame ſhould be carried out.

As to the firſt, it is exceeding probable, that the ſerous *Latex*, which is the Vehicle of the Spirits newly produced, and is introduced together with them into the Pores of the Brain, after it is grown ſtale, and being attenuated into Vapour, doth diſtil forth into this Cavern, and there at laſt grows into a watry Humor: for otherwiſe what becomes of that Humor, or into what other Receptacle could it be derived? Beſides this ordinary, and I believe aſſiduous heaping together of the ſerous Colluvies within the Ventricles of the Brain, certainly it may be believed, that this kind of ſerous Humor is diſtilled out of the Glandula's inſerted in the *Choroeidal* infolding, being too much filled, into the Ventricles ſo called. I have often ſeen in a Dropſie the Glandula's of the Brain to be intumified, and like grains of Barley, burſting with too much wet, to become flaccid or withered, ſo that they could not retain the ſeroſities brought to them, but continually diſpoſed them into the Cavity beneath. Truly in a Dropſie of the Brain theſe Cavities or Ventricles are always ſeen to be full of water; the cauſe of which kind of diſtemper is, the blood being made more watry, puts off in its circulation a greater heap of Serum than the Veins can preſently carry back, or the Glandula's are able to receive and retain. For indeed, that the Serum, redounding on every ſide from the Veſſels, may the better ſlide into the Ventricles of the Brain, it is ſo ordered, that the greater infoldings of the Veſſels, with the inſerted Glandula's, ſhould be diſpoſed near all the Ventricles of the Head: becauſe, not only the infolding *Choroeides* is placed nigh the concourſe of the three Ventricles in the Brain, but another infolding, and no leſs noted, (which we have above deſcribed) with greater Glandula's, is ſet behind the Cerebel nigh the fourth Ventricle, In all, as it ſeems, for that end ſuch care is taken, that the watry part, coming from the blood, which is deſtinated either for the Brain or the Cerebel, for that it is not fit for the procreating of Spirits, might run into theſe infoldings of the Veſſels. But yet if a greater plenty of Serum be there laid up, than can be contained in them, or may be ſent away outwardly, whatever is ſuperfluous will ſlide into the Cavity underneath.

Hence

Hence it appears, from whence, and by what means the ſerous heap is gathered together within the Ventricles of the Brain: certainly to deny this going out is no other than to aſſert every ones Brain big with a Viper, which cannot be brought forth but by gnawing aſunder the bowels of its parent. Who ſhall lightly conſider the parts nigh the Ventricles,and their Fabricks,at firſt ſight only would ſwear with the Ancients, that the excrements of the Brain were laid aſide both lower through the Tunnel into the Palate, and above or more forward through the mammillary Proceſſes into the Noſtrils: But if the ſtructure of theſe parts be a little more diligently ſearched into, there is no body who preſently will not eaſily think,that by neither of theſe ways the excretion of any humor can be made; for neither from the pituitary Glandula through the Wedge-like bone, nor from the mammillary Proceſſes through the holes of the Sieve-like bone, is there any manifeſt aperture or opening to be perceived. But in very truth, we do ſuppoſe that the Brain is in ſome meaſure purged by both theſe Emunctories, for that objection may be anſwered, That the tranſlations of Humors in living Creatures are eaſily performed through places that ſeem impervious or unpaſſable; for while the Pores and paſſages in all the parts of a living Creature are dilated by ſpirit and heat, they tranſmit the rain of the Serum as through the fine texture of a woolen Cloth. This plainly appears from Athritick diſtempers,in which the ſerous *Latex* creeps by degrees through the nervous bodies,and paſſing through very ſmall ſpaces,makes a falling down of humors ſometimes upon theſe parts,and ſometimes upon others; ſo that it is obvious, that the Membranes and nervous Proceſſes drink in the ſerous humors like Sponges,and then by a light compreſſion render them by heaps, as is manifeſt in the Tooth-ach; for as often as a Bodkin or Inſtrument is put up into a hollow Tooth, clear water will come out plentifully. Indeed, in the body of a living Creature the paſſages of humors are not only made through open paſſages and chanels; but the thinner and more watry *Latex* creeps through the ſolid and ſmooth bodies of the Nerves, as alſo the Fibres and the Membranes,as through the holes of a Filtre, and ſo is transferred through imperceptible ſtraits from place to place. I ſometime knew in the Impoſtume of the Lungs the humor to have been derived through the Membranes growing to the *Pleura* from the bag into an Iſſue made in the ſide, and ſo the ſpitting ceaſing, the Diſeaſe that ſeemed otherwiſe incurable,was healed by ſuch a way of Evacuation. Why in like manner may we not ſuppoſe the ſerous humors falling down from the Ventricles of the Brain into the pituitary Glandula, and the mammillary Proceſſes to be carried away through the Nerves or Membranes paſſing through here or there?

Concerning the Tunnel, the thing is probable enough; becauſe the poſition and ſtructure of this ſeem to ſhew,that ſome humor is carried out of the Ventricles of the Brain towards the pituitary Glandula. For this part is ſo conſtituted, that a falling down of the humors may be made from every angle and receſs of the interior Brain and its Appendix into its aperture or opening. And as in ſeveral Animals, the figure and ſite of the Ventricles vary very much, (as we have already ſhewn) yet in every one of them all the Ventricles of the Head, whatſoever they be, have their openings gaping towards the Tunnel. But that this Kernel or Glandula, to which the paſſage of the Tunnel is inſerted, receives and carries out the ſerous humors, ſeems alſo to appear from hence; becauſe it admits, not only thoſe falling from the Brain into its Pores, but alſo thoſe ſecreted from the blood aſcending into the Brain: For that in many four-footed beaſts, certain Veſſels are inſerted to this Glandula from either Carotidick Artery, which intimately enters its ſubſtance: a ſign of which is,that Ink being injected into the Trunk of either Artery, dyes with a black colour the wonderful Net, if it be there, and oftner the interior ſubſtance of this Glandula: whence it may be argued,that the office of this Glandula is to receive the ſuperfluous ſeroſities; and it receives not only thoſe ſent away in the return from the Brain, but ſometimes preoccupies or prevents them, and is wont to derive them from the blood before it is carried to the Brain. And therefore this Glandula is very ſmall,if the ſuperfluities of the Serum be derived to it only from the Brain; but greater, if they come to it alſo from the blood,to wit,as it executes either one or a double office,as we have already ſhewn at large.

But as to what reſpects the way of paſſing through,to wit,by which the humors depoſited in this Glandula, are carried out, the vulgar Opinion is, that they do come away through the holes of the bone beneath into the Palate: wherefore in thoſe kind of Animals, who have the wonderful Net, and many of its ſhoots enter this Glandula, more holes are made in the underlying Bone. Further, if you take away the ditch or gutter of the Wedge-like bone,or the ſeat of this Glandula cut off from the Skull, and pour water upon its holes being made bare from the Membrane, it paſſing preſently through the ſubſtance of the whole bone, will ſuddenly ſtill forth through other holes lying open in the ſides of the bone. Yet this Experiment concludes nothing for the Opinion propoſed: becauſe theſe holes are wholly wanting in ſome Creatures, and very much in an humane Skull; in thoſe who have them, as in a Calf, eſpecially it is obſerved, that the ſame are filled by ſome hollow Veſſels; into which, if a black liquor be caſt by a Syringe, that paſſing through the ſubſtance of the bone, will go into many other Veſſels lying under the bone, and at length into the Trunk of the Jugular Vein; which certainly is a ſign that the humors are not carried from hence into the Palate. But as to the Veſſels which cover over the holes of the bone, and which more abundantly lye under the ſame, they ſeem to be either Veins or Lymphæducts.

But among theſe it is lawful to conjecture, the chief means of Excretion, whereby the ſerous humors, laid up in the pituitary Kernel, may be carried out; to wit, that they are remanded back from it, as from moſt other Glandula's or Kernels, into the maſs of blood. In a Calf the thing lies open

to ocular Inſpection, nor is it to be doubted of other Animals, who have the admirable Net: becauſe as the arterious branches, ſo alſo the veinous reach to this Glandula; which ſup up not only the humors depoſited from the Arteries, but alſo thoſe falling from the Ventricles of the Brain. Yea, it may be lawfully believed, that in a Man alſo, a Horſe, and in other Creatures, who want the ſtrange or wonderful Net, there are other Lymphæducts or Water-carriers, or ſuch kind of Veſſels, as are ſeen in the head of a Calf, that moſt certainly carry the humors from this Glandula. We cannot ſo eaſily find out their footſteps, becauſe, before theſe break out of their dens, the tracts of the Lymphæducts, if there be any, would vaniſh. Nor can we find out theſe Veſſels in all, as in a Calf, by injection; becauſe the holes of the bone, by which, as by the leading of a thread, the injection arrives at, and dyes the Veſſels, otherwiſe lying hid, are wanting in moſt. No doubt but time will render ſufficiently manifeſt the reductions of the humors from the pituitary Glandula in other living Creatures: in the mean time, it may be lawfully ſuſpected, for that the ſeroſities in ſome are remanded from thence into the bloody maſs, that in all it is done after the like or the ſame manner, although the ways of the paſſing do not yet ſufficiently lye open.

As to the other Emunctory of the Brain, to wit, whereby the ſerous humors, laid aſide from the Ventricles of the Brain into the mammillary Proceſſes, and thence are thought to be ſent away through the holes of the Sieve-like bone. truly, concerning this way of Excretion, it is much more to be doubted, becauſe theſe holes in the defunct being covered over and fully ſtuft, with the inſertions of the *Dura Mater* and nervous Fibres, ſent on either ſide from the mammillary Proceſs, tranſmit nothing of humor, how clear ſoever it be. Further, there is nothing more certain, than that the ſerous humors are preſſed out from the Glandula's and extremities of the Veſſels ending within the Noſtrils into their Caverns; ſo beſides that 'tis ſcarce poſſible for the humors to deſcend thither from the Brain, it is not abſolutely needful to ſuppoſe this ſort of means of Excretion. But that we may reaſon a little farther concerning theſe; if it may be lawful to argue from the proviſion, and from the effects of the parts, there is no reaſon but that I may probably believe, that ſome humors alſo do ſhower down from the Brain into the cavities of the Noſtrils: for it being ſuppoſed, that the ſerous humor paſſes through, not only open chanels, but the more ſtrict Pores and paſſages alſo of the Nerves, and creeping both through the Fibres and Membranes, as through the ſtrainings or holes of a Filter or Strainer, is carried from place to place, (which it were eaſie to demonſtrate) what ſhould hinder but that the ſame ſort of *Latex* may deſcend through the Fibres impacted in the holes of the ſtraining bone? For although in dead creatures thoſe parts ſeem to be impervious or unpaſſable, yet during the life of the Animal the paſſages and blind ways of the nervous bodies, being dilated by Spirit and Heat, moſt eaſily tranſmit a copious humor wherewith they are watered.

The Sieve-like Bone in divers Animals is variouſly perforated for the manifold neceſſity and difference of ſmelling. A Proceſs from the *Dura Mater* and manifold nervous Fibres paſs through every one of its holes, and beſmear the inſide of the Noſtrils. But as the impreſſions of ſenſible things, or ſenſible Species, continued as it were by the undulation or waving of the animal Spirits, aſcend through the paſſages of theſe bodies ſtretched out from the Organ towards the Senſory; ſo the humidities watring the ſame bodies, for as much as ſometimes they may be more ſuperfluous than uſual, may diſtil into the Noſtrils through the ſame ways. For indeed ſuch humors as are perpetually to be ſent away from the brain, ought ſo copiouſly to be poured upon the Organs of Smelling, as we ſhall ſhew hereafter, when we ſhall ſpeak particularly of the Smelling Nerves; in the mean time, that there is ſuch a way of Excretion opening into the Noſtrils, ſome obſervations, taken of ſick people troubled with Cephalick diſeaſes, do further perſwade. I have known ſome very obnoxious to the Scotomy and Vertiginous diſtempers, who had great plenty of clear water that diſtilled forth about the end of the Fit; by which kind of Evacuation, as it were Critical, the Fit was wont to be ended. Not long ſince, a Virgin living in this City, was afflicted a long time with a moſt cruel Head-ach, and in the midſt of her pain much and thin yellow Serum daily flowed out from her Noſtrils: the laſt Winter this Excretion ſtopped for ſome time, and then the ſick party growing worſe in her Head, fell into cruel Convulſions, with a ſtupidity; and within three days dyed Apoplectical. Her Head being opened, that kind of yellow *Latex* overflowed the deeper turnings and windings of the Brain, and its interior Cavity or Ventricles. I knew a Gentlewoman that was wont to be infeſted with a moſt cruel Head-ach, alſo with a *Vertigo*, and a frequent melting of the Animal Spirits, or Swooning away; who when ſhe began to be better after a grievous Fit, felt at firſt a creeping motion in the top of her Brain, as it were the ſliding down of water: then that motion paſſing a little more forwards and downwards, at length many drops of clear water diſtilled from her Noſtrils. This Symptom ſhe uſed to have ſo ordinarily, that the ſick Gentlewoman did not doubt but that this water ſtilled out from the Brain it ſelf. I could here bring many other reaſons, which might ſeem to perſwade, that the Ventricles of the Brain, or the Cavity made by the complicature or folding up of its border, is a mere ſink of the excrementitious Humor; and that the humors there congeſted, are purged out by the Noſe and Palate: But it is time for us to haſten to other matters, and to paſs from the Brain, properly ſo called, to its Appendix, *viz.* the oblong Marrow and the Cerebel.

CHAP.

CHAP. XIII.

The Actions and Uses of the oblong Marrow, and some of its Parts are unfolded.

WE will pass now from the Brain to the explication of its Trunk, to which both it and the Cerebel do grow like Mushrooms or large Excrescences. This part is commonly called the Oblong Marrow; under which name we comprehend all that substance which reaches from the inmost Cavity of the callous body, and conjuncture in the Basis of the Head, to the hole of the hinder part of the Head; where the same substance, being yet farther continued, ends in the spinal Marrow. The superficies of the oblong Marrow, though it be made unequal with some protuberances and processes, yet it is not variegated or garnished with any turnings about, and involutions, as it is in the Brain and Cerebel; neither is its exterior and cortical substance, or of an Ash-colour, and the interior, medullar or marrowy and white; but all its frame or substance is in a sort marrowy or medullous: nor does it however appear pure and bright, but much darkened with fibres and hairs variously stretched forth, and diversly going out. To wit, its fibres being figured in various places, after a diverse manner, in some places they are found chamfered, and as it were beamy, in others direct or stretched out at length, and in other places again circular.

The Figure of this is forked, and as it were like the Poets *Parnassus*, seems like the letter Y: for its shanks arising more forward from either Hemisphere of the Brain, and inclining one to another, grow together near the centre of the Skull into one and the same Trunk; which notwithstanding, a line being brought through the midst, seems to be made as it were out of two stalks, and those to be distinguished in its whole process.

The oblong Marrow seems to be a broad or high Road, into which the Animal Spirits perpetually flow from their double Fountain, to wit, the Brain and the Cerebel, to be derived from thence into all the nervous parts of the whole Body; which Spirits, whilst they are orderly disposed in this common passage, as it were by series and orders, carry a twofold aspect; to wit, they are directed either outward towards the Nerves, when they exert the loco-motive Faculty, or they look inward towards their Fountains, when the acts of sense, or rather the apprehensions of sensible things are performed.

Within this open way, a more large and greatly open path leads straight to the spinal Marrow, through which the Spirits flow forth to the Nerves, the Executors of spontaneous motion in most Members. In the mean time, out of the same tract of the oblong Marrow, lesser paths are carried outwardly, here and there, by particular Nerves, arising from the same, within the Skull. Also besides, many diverting places, *viz.* various processes and protuberances grow to this medullary Trunk, into which, the Spirits destinated to some peculiar offices, go apart: lest that all the Spirits travellinng this way, and that way in the same path, should meet one the other and disturb one anothers offices.

Whilst after this manner, for the performing the acts of Motion and Sense, we suppose the Animal Spirits to be expatiated within the oblong Marrow; we affirm, that they are not there begotten, but only exetcised. For indeed, they being created only in the Brain and Cerebel, as they proceed from this or that, they perform their offices, either of a merely involuntary Function, or else of a spontaneous, as shall be shewed more largely hererfter.

But that we may unfold here all things which belong to the oblong Marrow, I shall mete it forth from its first coming out to the end of its race, and handle its several *Stadia*, diverting places, and cross ways. Where the callous Body is thought to end, the oblong Marrow begins, to wit, when the medullar substance of the Brain is thickest nigh the bosses or knobs of either Hemisphere, a body of a whitish colour and somewhat darkned or obscured, and streaked like Ivory, is joyned to that Marrow on both sides. These two bodies are the extremities or tops of the shanks of the oblong Marrow; between which and the Brain there are nigh and very immediate commerces. Either of these seems as it were a Cylinder rolled about into an Orb, which nevertheless constitutes the top of either shank, not spherical, but oval, and something bent downward in the hinder part. A more large portion of its superficies is joyned to the medullar substance of the Brain; but yet some part of it, being free from the cohesion with the Brain, shews it self apart, and makes that protuberance shewing it self in either lateral Ventricle. These bodies, if they should be dissected along through the middle, appear marked, with medullar streaks, as it were rays or beams; which sort of chamferings or streaks have a double aspect or tendency; to wit, some descend from the top of this body, as if they were tracts from the Brain into the oblong Marrow; and others ascend from the lower part, and meet the aforesaid, as if they were paths of the Spirits from the oblong Marrow into the Brain. And it is worth observation, that in the whole Head besides there is no part found chamfered or streaked after the like manner.

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If the uſe of theſe be inquired into, this preſently occurs, that theſe bodies, placed between the Brain and its Appendix, are the great and common diverting places of either; to wit, which receive whatſoever impulſes or forces of the Animal Spirits are ſent from either, and communicate them preſently to the other: Or that I may ſpeak more plainly, this part is the common Senſory, to wit, as *Ariſtotle* ſaith, τὸ πρῶτον αἰσθητήριον, the firſt Senſory that receives the ſtrokes of all ſenſible things, dilated from the Nerves of every Organ, and ſo cauſes the perception of every ſenſe; which kind of ſtrokes of ſenſible things, when from hence they are paſſed further into the Brain, preſently Imagination ſucceeds the Senſe: and further, theſe bodies, as they receive the forces of all the Senſes, ſo alſo the firſt inſtincts of ſpontaneous local motions. To wit, as often as the Appetite diſcerns any thing to be done, preſently the reciprocal tendencies of the Animal Spirits, that is, from the Brain into theſe parts, are diſpoſed here to act the conceptions of motions coming from any part or member. For here, as in a moſt famous Mart, the animal Spirits, preparing for the performance of the thing willed, are directed into appropriate Nerves. That it is ſo, it appears, becauſe every influence from the Brain into the nervous ſtock, and on the contrary, from this into that, and the mutual commerce of the animal Spirits, muſt of neceſſity paſs through theſe bodies. Wherefore all the Nerves, alſo thoſe which belong to the more inward Organs of the Senſes, ariſe behind theſe chamfered bodies. For the Optick and ſmelling Nerves creep through the ſuperficies of the Brain by a long paſſage and windings about, that they might be inſerted below this part of the oblong Marrow.

For indeed, the Species of ſenſible things, received by thoſe Nerves, might more immediately be carried to the middle of the Brain, unleſs that they ought firſt to be ſtaid at this Senſory. Further, we may lawfully conjecture, that theſe parts perform the aforeſaid office from their chamfered, and as it were beamy contexture: For as thoſe chamfering with which theſe bodies are marked, (as we but now intimated) are of a double kind, to wit, ſome deſcending, which look from the Brain towards the oblong Marrow: and others aſcending, which are carried diſtinctly from this towards that, it may be lawfully concluded, that in theſe carried upwards, the impreſſions of ſenſible things are perceived; and in thoſe tending downwards are performed the Inſtincts of Motions.

Further, that theſe bodies, as was ſaid, perform the offices of the firſt Senſory, beſides the fabrick of their parts, and the Analogy to be collected thence of their uſe, it ſeems yet more certainly to appear from ſome Obſervations concerning theſe chamfered bodies, after what manner they are affected in Paralytick diſeaſes. For as often as I have opened the bodies of thoſe who dyed of a long Palſie, and moſt grievous reſolution of the Nerves, I always found theſe bodies leſs firm than others in the Brain, diſcoloured like filth or dirt, and many chamferings obliterated. Further, in Whelps newly littered, that want their ſight, and hardly perform the other faculties of motion and ſenſe, theſe ſtreaks or chamferings, being ſcarce wholly formed, appear only rude.

The chamfered Bodies, inclining one to another near their blunt and greater angles, are almoſt contiguous; but that the Trunk of the *Fornix* intervenes with its twofold Root: yet in that place where the two Roots of the *Fornix*, being ſent ſtraight down, are inſerted into the callous body, a tranſverſe medullar proceſs, like a great Nerve, ſtretched from one chamfered body to the other, as it were joyns the ſame, and makes them to communicate one with the other. Certainly, this joyned together of the chamfered bodies is made, that their actions and paſſions may not be double: but though the ſpecies of the ſenſible object or conceptions of the motions to be performed, coming from the Brain or Senſory being double, are carried alſo double to the firſt Senſory; yet for as much as either ſubſtanc or frame of this, communicates with the other, every impreſſion coming this or that way, becomes ſtill one and the ſame. For it may be obſerved, in the whole Head, that though almoſt all things are double, yet each of them communicate among themſelves, either by a contiguity, or by proceſſes ſent forth. And ſo as by the duplication of it, care is taken againſt the abſolute privation or defect of the act, ſo the joyning together of its duplicature provides againſt the empty or confuſe multiplication of the ſame ſpecies.

After this manner, the chamfered bodies in Man and four-footed Beaſts are conſtantly found of the ſame ſpecies or form, and in every one of them, figured after the ſame manner; and are as it were the Joynts that joyn the brain to the ſhanks of the oblong Marrow. But we have already ſhewn, that in Fowls and Fiſhes, whoſe brains being alike, differ from thoſe of men and four-footed beaſts, the thing is ſomewhat otherwiſe: For in Fowls the callous body is wanting to the brain; but what ſerves inſtead of it, is found in the oblong Marrow, to wit, two little Ventricles ſhew themſelves nigh the chambers of the Optick Nerves, which are arched or chamber'd with a whitiſh ſubſtance, ſuch as the callous body is in man or four-footed beaſts. Then on the contrary, the chamfered bodies, or the parts which ſerve in their ſtead, in Fowls, are not a portion of the oblong Marrow after the uſual manner, but are entred into the Brain it ſelf. For near the fiſſure of the Brain, two Membranes being marked with medullar chamferings, both diſtinguiſh either Hemiſphere of the Brain, and cover over its Ventricles. The ſtreaks or rays of either Membrane deſcend, and being concentred about the Baſis of the Brain, go together into a medullary proceſs, which is inſerted on both ſides to the oblong Marrow. So theſe parts, *viz.* the callous body, in which the animal Spirits are expanded, and the chamfered bodies, in which their paſſing to and fro is inſtituted, ſeem to be tranſpoſed in the head of Fowls. The reaſon whereof, (as I elſewhere hinted) unleſs I be deceived, is this: becauſe theſe Animals are of leſs excellency in imagination and Memory than four-footed Beaſts; yea alſo, for that the ſenſe and motion of them are their chief

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Faculties: therefore for the exerciſes of theſe to be performed with a greater expanſion of Spirits, the callous body is transferred into the oblong Marrow, and in its place the chamfered bodies are removed into the Brain.

About the lower end of either chamfered body the ſmelling Nerves are inſerted. For you may take notice, that the mammillary Proceſſes, a little more obſcure in man, but much more conſpicuous in brute Animals, who are endued with a more remarkable ſenſe of ſmelling, do paſs into firm and plainly whitiſh bodies of Nerves, which being dilated or brought nigh the lateral turnings and windings of the Brain, are implanted into the oblong Marrow on either ſide about the lower angle of either Ventricle behind the chamfered bodies; yet ſo, that the Tube or Pipe of either Nerve may open into the Cavity of the Ventricle, as we before ſhewed. After this manner theſe Nerves are carried by a long journey from the fore-part of the Brain, that they may bring the ſenſible ſpecies to the chamfered body, as to the common Senſory, firſt and rather than to the Brain. But we ſhall ſpeak of the ſmelling Nerves more particularly hereafter.

Where theſe chamfered Bodies end from either ſide, a marrowy ſubſtance ſucceeds, which being ſomewhat of a darkiſh colour going forward for ſome ſpace, is diſtinguiſhed by a peculiar bending forward from the other contiguous parts. This *Galen* (perhaps not improperly) calls the Chambers of the Optick Nerves; for in this place the Optick Nerves ſhewing themſelves from the higheſt region of either ſide, being carried downward with a certain compaſs, are united about the Tunnel. Then being divided again, and carried a little further, enter the Skull, going ſtraight forward to either Senſory. The growing together of theſe Nerves, and their being again ſeparated, ſeems to be ordained for this end, that the viſible ſpecies, received from either Eye, might appear ſtill the ſame, and not double; for this conjunction of the twofold Organ frames the double image into one; which once united, when afterwards it is carried to either ſide of the common Senſory, for that it is on both ſides alike, appears ſtill the ſame. If at any time, through drunkenneſs, or a diſtortion of the Eyes, the object appears double, and two Lights upon a Table, it is becauſe the image of the ſame thing is received after a different manner by one Eye than the other, for that reaſon the objects are repreſented like two diſtinct things. For that this Eye is diſtorted after one manner, and that after another, the ſame Species, coming to either Pupil by a diverſe angle of incidence, appears diverſe or double. There is another reaſon of the coalition of the Optick Nerves, to wit, that one Eye being hurt, all the viſible Animal Spirits might be beſtowed on the other. Further, for that theſe Nerves are carried with a long paſſage, their uniting helps to their mutual ſtrength and ſupport.

Whereas the Optick Nerves ariſe here from the oblong Marrow, all or its moſt intimate ſubſtance is not beſtowed upon them; but theſe Nerves are inſerted into the medullar Trunk, as branches of a Tree to the ſtock, that ſo they may receive by that means the influence of the Spirits, and by this way tranſmit the Species of viſible Things. In the mean time, this more inward ſubſtance of the oblong Marrow is the common paſſage both to the Eyes and to the other nervous Syſtem ariſing more backward: through which, by the going and returning to and fro of the animal Spirits, the impulſes of ſenſible things, and the inſtincts of Motions between the Brain and the other nervous parts, which depend upon it, are performed. Foraſmuch as the ſmelling and ſeeing Nerves ariſe ſo near the chamfered bodies, the reaſon hence is plain, why odors or the objects of the ſenſe of ſmelling ſo ſtrike the Brain it ſelf, and immediately affect it; alſo why there is ſo exceeding ſwift a communication between Sight and Imagination.

Concerning the Optick Nerves in a Man, (which alſo in ſome meaſure is after the ſame manner in other living Creatures) we ſhall advertiſe you, that when they, after their uniting or mixing together, being preſently again ſeparated, do go out of the Skull, the ſanguiferous Veſſels going out of the Skull with them, and following either Nerve even to the Baſis of the Eye, are knit into the Trunk of either There is a noted ſhoot of the Artery deſtinated to this office, carried from the anterior branches of the *Carotides*. Hence, as I ſuppoſe, a reaſon may be given, wherefore, when by drinking or more plentiful eating, a ſleepineſs is cauſed, preſently a great heavineſs, and as it were an oppreſſion, is felt about the Eyes. For when the blood, very much boiling up, fills above meaſure the Veſſels watering the Brain, and by diſtending them, obſtructs the Pores of the Brain, thoſe Nerves alſo from the blood in like manner boiling up within the Optick Veſſels, are preſſed together in their whole paſſage.

In Fowls and Fiſhes this chamber of the Optick Nerves, bunching out with a great bulk, is not much leſs than the Brain it ſelf; for, as we but now intimated, what is inſtead of the callous body is placed here; and in this place the Animal Spirits ſeem to have their chief Mart or Empory in a moſt large medullar chamber, or the Sphere of their Expanſion. And ſo, when from hence the Animal Spirits are derived from ſo full and plentiful a Store-hoſe, it is for that reaſon Fowls are furniſhed with ſo curious an Eye, and with ſo highly perſpicacious and acute a ſight. And the ſame perhaps may hold concerning Fiſhes, if that we conſider the ſight in theſe is performed in a thicker Medium, and often double.

In ſome Animals, in the midſt of theſe chambers of either Optick Nerve, the ſhanks of the oblong Marrow a little opening, leave a chink or aperture, which receiving the ſeroſities coming from every region of the Brain and its Appendix, ſends them through the Tunnel into the pituitary Glandula.

There is no need that we ſhould diſcourſe much here of the Tunnel and the pituitary Glandula, becauſe, already ſpeaking of the Ventricles of the Brain, or the empty ſpace left within its plicature, we fell occaſionally on the conſideration of both theſe: where we ſhewed, that the ſerous humors, which were

wont

wont to be heaped together within many places of the Brain and of its Appendix,do all ſlide down on every ſide from each angle and receſs of it into the ſteep opening of the Tunnel; and ſo there is a neceſſity that they ſhould be poured out by it into the pituitary Glandula. Further, it is manifeſt, that this Glandula, in ſome Animals, is charged with a double office; to wit, as it receives the ſeroſities ſent from above from the Brain, ſo alſo it ſeparates the humors from the blood brought to the ſame from the wonderful Net by the Arteries, and prepoſſeſſing them, imbibes them before their ingreſs to the Brain. Wherefore this part is furniſhed with a ſubſtance of a double kind, *viz.* one reddiſh, more thin, and interwoven with Blood-carrying Veſſels, which conſtitutes either ſide of it; and the other more white placed in the middle, to which the Tunnel is inſerted.

But having ſhewn, that this Glandula receives the humors ſo brought by a double Tribute, we did diligently inquire concerning the ways and means whereby they are at length carried away from thence, and as it appears by an Experiment, that there is a paſſage open from this Glandula into the Veſſels lying underneath the bone, and from thence into the Jugular Veins, we affirmed, that 'twas moſt likely, that the humors to be carried away from this Glandula, (after the manner of others) may be reduced at laſt into the bloody maſs. I ſhall not add any more concerning theſe things, but proceed to the other parts of the oblong Marrow. But that, what hath been ſaid, concerning the ſhanks of the oblong Marrow, and their tops, *viz.* the chamfered bodies, may be the better underſtood, it will ſeem to the purpoſe that we repreſent the Images of all theſe in the following Figure.

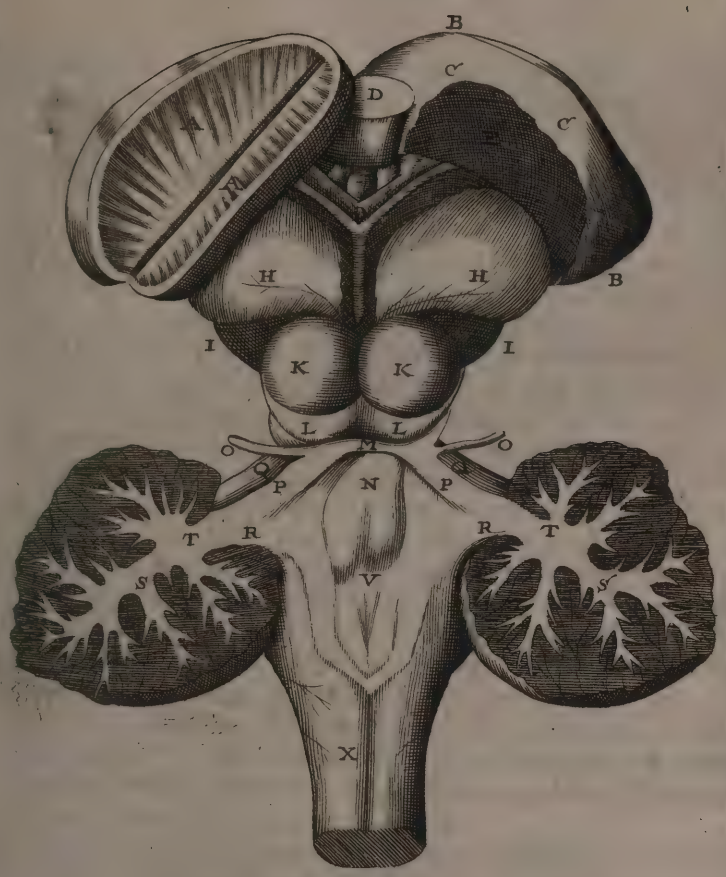
The Eighth Figure.

REpreſents the oblong Marrow taken out of the Head of a Sheep with the Brain cut off and removed, and with the Cerebel and one ſtreaked Body cut in two in the middle, and other things chiefly belonging to the medullar Trunk.

AA. *The chamfered Body cut in two in the midſt, that its marrowy chamferings may appear.*
B. *The other chamfered Body whole covered with the Choroeidal Infolding with the extreme portion of the callous Body* CC. *ſticking to the ſame.*
CC. *The brim or extremity of the callous Body cleaving to the chamfered Body.*
D. *The Baſis of the* Fornix.
E. *The right wing of the Chorotidal Infolding.*
F. *The paſſage of the Veins being ſtretched out from the fourth boſom, which being preſently forked, conſtitutes the veinous portion of either wing of the Choroeidal Infolding; under the beginning of this paſſage, very much beſet with Fibres and ſanguiferous Veſſels, the Pineal Glandula lyes hid.*
G. *The hole or chink leading to the Tunnel.*
HH. *The chambers of the Optick Nerves.*
II. *The medullary proceſſes, or the ways of paſſage which lead from the medullar ſtock into the orbicular Protuberances.*
KK. *The Buttock-form orbicular Protuberances.*
LL. *The leſſer Protuberances called* Teſtes.
M. *The meeting together of the Proceſſes aſcending obliquely from the* Teſtes *into the Cerebel.*
N. *The hole of the lower Ventricle lying under the orbicular Protuberances.*
OO. *The pathetick Nerves of the Eyes.*
PP. *The medullary Proceſſes ſtretched out from the* Teſtes *into the Cerebel.*
QQ. *Other medullar Proceſſes, which being ſent from the Cerebel towards the oblong Marrow, compaſs about its ſtock, and conſtitute the annular or ringy Protuberance.*
RR. *The loweſt or third Proceſſes of the Cerebel, which being inſerted to the medullar Trunk, become additional cords or ſtrings of it.*
SS. *The medullar Ramifications or Branchings of the Cerebel.*
TT. *The middle marrows of either Cerebel in which its three medullary Proceſſes, conſtituting either little foot of it, grow together.*
V. *The Ditch conſtituting the fourth Ventricle in the medullar Trunk.*
X. *The extremity of the oblong Marrow about to end in the Spinal.*

CHAP.

Fig. VIII. II. p. 86



CHAP. XIV.

Of the Uſes of the Pineal Glandula and the Choroeidal Infolding; alſo of the orbicular Prominences which are commonly called Nates *and* Teſtes; *and other Parts which ſeem to be dependences of them.*

BElow the Chambers of the Optick Nerves in a common Valley which lyes between the tops of theſe and the Buttock-form Prominences, is placed the Pineal Glandula or Kernel in form of a Pine-apple, called alſo *Conarium*; this is not only found in Man and four-footed Beaſts, but Fowls and Fiſhes alſo are endued with the ſame. Wherefore, although from hence it may be concluded, that this is of neceſſary uſe; yet we can ſcarce believe this to be the ſeat of the Soul, or its chief Faculties do ariſe from it; becauſe Animals, which ſeem to be almoſt quite deſtitute of Imagination, Memory, and other ſuperior Powers of the Soul, have this Glandula or Kernel large and fair enough.

It is obſerved in all Animals of every kind and form, that to this Glandula, always placed nigh the holes or paſſages, open to the Tunnel, the Choroeidal Infolding is continually joyned; yea this infolding (ſeeming to hang from the Pineal Kernel ſuſtaining its middle Proceſs, as it were by a nail or haſp, from thence) is divided into two wings ſtretching out on either ſide upon the ſhanks of the oblong marrow, Wherefore we may juſtly ſuſpect, that this Glandula is chiefly made for the ſake of this infolding; and that the office of it is no other than of other Kernels, which are placed nigh the concourſe of the ſanguiferous Veſſels: to wit, that it may receive and retain within it the ſerous humors depoſited from the arterious blood, till the Veins being emptied, may ſup them back, or the Lymphæducts (if there be any there) may convey them outwardly. For it is obſerved, that the Choroeidal infolding is beſet with very many leſſer Glandula's or Kernels, and every where interwoven with them, which imbibe the Serum ſecreted from the blood, in the ſmaller Veſſels; therefore for this very ſame office, where all the Veſſels concur, this Kernel is placed, of a bigger bulk, that it might be able to receive and contain the ſeroſities there plentifully depoſited. Moreover, it is of no ſmall moment, that this Glandula ſuſtains and keeps duly ſtretched out the *Choroeidal* infolding otherwiſe hanging looſe, and apt to fall down into it ſelf, or at leaſt to ſlide out of its proper place. Wherefore I have often taken notice in the Dropſie of the Brain, that this *Glandula* being looſned at the roots by too much moiſture, and often broken off, and removed from its place, the *Choroeidal* infolding hath ſlid together from its proper expanſion, and ſlip'd down lower, and alſo ſuffered its Veſſels to be folded together diſorderly.

From theſe things thus premiſed concerning the Pineal Glandula, it will not be difficult to aſſign alſo the uſe of the *Choroeidol* infolding: Concerning which there will be little need to refel that Opinion of the common ſort, which aſſerts, That the animal Spirits, to be beſtowed upon the whole Brain, are begot in this infolding: becauſe the Veſſels of this inſtil nothing to the ſubſtance of the Brain or its Appendix, for that they are no where inſerted to it; but it was before ſhewn, that the Ventricles of the Brain, or the Cavity in which theſe ſame Veſſels are hung, do not at all contain the Spirits; which further appears more plain, becauſe in Cephalick diſeaſes thoſe Ventricles are filled with water, and the continuity of the infolding is diſſolved by too much moiſture, when in the mean time the ſick are indifferently ſtrong in the exerciſe of the animal Faculties.

But indeed we ſuppoſe, that this infolding ſerves for a twofold office: *viz.* Firſt, that the more watry part of the blood, deſtinated for the Brain, might be ſent away into its Veſſels, to the end, that the remaining portion of the bloody *Latex* might become more pure and free from dregs to be diſtilled forth into Spirits; even as is wont to be done in a Chymical Diſtillation, to wit, when there is a peculiar Receiver fitted for the receiving of the Phlegm by it ſelf, more ſincere, pure, and ſubtil Spirits are inſtilled into the other more noted Receiver. The more watry blood entring the arterious Veſſels of this infolding, being carried from them into the Veins, is remanded back towards the Heart. In the mean time, leſt the Serum, too much redounding, and boiling up in theſe Veſſels, might hinder circulation, its ſuperfluities are received for ſome time both by the leſſer Glandula's thickly inſerted, and alſo by the pineal Kernel.

The other and no leſs noted uſe of this Infolding, is to conſerve the heat of the blood boiling within the complications of the Veſſels, and as it were circulating about, being excited as from a fire-place within the infolding of the Brain. For though the *Pia Mater* need not implant thick ſhoots of Veſſels in the callous Body and inward Marrows of the Brain, for that they are rather dedicated to the Exerciſe than to the Generation of the animal Spirits; yet that the heat requiſite for the circulation of the Spirit, might be kept conſtantly in that place, this infolding is hung upon the whole neighbourhood. For as the blood, aggeſted or heaped together within the Cavities of the Boſoms, is inſtead of an

hot Bath, whereby the animal Spirits are diſtilled plentifully into the outmoſt and cortical part of the brain; ſo the blood contained within the ſmall Veſſels of this infolding, ſeems to be in the place of a leſſer and more temperate Bath, whereby the ſame Spirits might be fitly circulated in the more inward and medullar ſubſtance.

Laſtly, Another reaſon may alſo be given, why the Choroeidal infolding is found always within the Ventricles or Cavity of the Brain, made by its infolding, and after what manner ſoever figur'd; to wit, that another ſort of commodity might reſult from thence; that when the Veſſels of that infolding, carrying too watry blood, lay aſide more Serum than the Glandula's are able to receive or contain, whas is ſuperfluous might ſlide down opportunely into the underlying Cavity, as into a Sink. Wherefore the *Pineal Glandula*, though ſet in a more eminent place, is however placed always near the hole or paſſage that lyes open towards the Tunnel in every Brain.

Next to the Pineal Kernel are found in the upper ſuperficies of the oblong Marrow certain noted Prominences, which are commonly called *Nates* and *Teſtes*. Theſe being placed naar together, do conſtitute as it were four Mole-hills, which yet are joyned one to another by certain proceſſes. Beneath theſe Mole-hills, or rather between the joyning of them and the runk of the oblong Marrow, placed underneath, a narrow and long Cavity or Den is left, which by ſome Anatomiſts is called the fourth Ventricle; but according to others later, who place the fourth Ventricle under the Cerebel, this Cavity is affirmed to be a paſſage to it.

The hinder extremity of this Den ends nigh the beginning of the fourth Ventricle; the more fore-extremity of it opens before the former Mole-hils or little bulkings out, called *Nates*. From the midſt of this Cavity or narrow Den a paſſage goes ſtraight to the Tunnel. It is very much controverted among Anatomiſts concerning the ſite of theſe parts, and of their dependency on one another, and of other parts, and of their uſe: Concerning which this is firſt to be noted, as we hinted above, that theſe four Protuberances are far greater in ſome brute Animals than in a Man, as in a Sheep, Calf, Goat, and the like; alſo in a ſound dry, and old Head they are more conſpicuous, and their proceſſes, joynings and habitudes may be more eaſily noted than in a younger, moiſt, or otherwiſe ſickly brain. Indeed the uſe of theſe (unleſs my conjecture deceives me) ſeems far more noble, than that they ſhould deſerve thoſe vile names of *Nates* and *Teſtes*, Buttocks and Teſticles.

Notwithſtanding, to what office theſe parts were deſigned, neither have the ancient Anatomiſts delivered, nor will it, by the help of Reaſon, be eaſie to gueſs for certain. We have already ſhewn, that theſe aforeſaid Prominences ought not to be taken for the two ſhanks either of the Brain or Cerebel bending back one towards another, and ſo growing together into the oblong Marrow. For although from this ſuppoſition a very neat Hypotheſis may be made for the œconomy of the animal Function, to wit, by affirming that theſe double ſhanks, on either ſide, were ſo many diſtinct ways of paſſage through which the animal Spirits, for the performing of motions, flowed from the Brain and Cerebel into the oblong Marrow, and returned thence from this into thoſe for the performing the acts of the Senſes: yet from our Method of Diſſecting it plainly appears, that the brain is not fixed to the oblong Marrow nigh this place, but far above it; ſo that indeed the anterior Prominences, unleſs mediately only, *viz.* by the chamfered bodies, receive not any portion of the medullar ſtock, or any influence from the brain, nor can have any dependency from it. Beſides, if the Protuberances called *Nates* were ſhanks of the brain, why ſhould the ſame be in man, (he having got the greateſt brain, the leaſt) or at leaſt leſſer than in moſt other living Creatures? Then between the Prominences called *Teſtes* and the Cerebel, although there happens a certain communication; yet it ſeems that there lyes open a paſſage from thoſe little lumps into the Cerebel, and not from this, through them into the oblong Marrow. For out of theſe aforeſaid Prominences a medullar Proceſs aſcends obliquely one either ſide into the Cerebel, by whoſe paſſage the animal Spirits, tending frome one ſtage to the other, cauſe a mutual commerce between thoſe parts and the Cerebel: But indeed the Proceſſes which lead from the Cerebel into the oblong Marrow, and carry to it its influences, being diſtinct from the former, ſtand ſomewhat lower, as ſhall be more clearly ſhewn hereafter, when we ſhall ſpeak of the Cerebel.

But in the mean time, concerning the offices and uſes to which the aforeſaid Protuberances ſerve, we ſhall make this conjecture. The animal Spirits perpetually flow out and leap back again from the fountain the brain into the oblong marrow, ſo that there may be had a conſtant commerce between the brain and many organs of ſenſe and ſpontaneous motion: from which thoſe parts are entertained which perform their actions, not at the beck of the Appetite, but either by the inſtinct of Nature, or the blind impulſe of the Paſſions; for ſuch receive wholly their influences from the Cerebel, as afterwards ſhall be more fully ſhewed. Whilſt therefore the Spirits, flowing from the brain, abound in the oblong marrow, it is fit that ſome of them ſhould be carried from thence into the Cerebel: (for what uſes this ought to be done, ſhall be told by and by) wherefore from either ſide of the oblong marrow a Protuberance grows forth, into which indeed the Spirits deſigned for the Cerebel, may go apart from the common paſſage of the oblong marrow; and theſe Prominences are the former, which are commonly called *Nates*, and as we have ſaid, are far greater in moſt brute Animals than in Man (the reaſon of which ſhall be declared anon.) The other hinder Protuberances, commonly called *Teſtes*, grow to theſe former, and are only certain Epiphyſes or Excreſcences of them, as it were the heads of the medullary Proceſſes, which are from thence carried by an oblique aſcent into the Cerebel; for when the animal Spirits

aſcend

aſcend from the former Prominences into the Cerebel, they enter theſe latter firſt, as it were the more large beginnings or entrances of their paſſage, from whence they go forward by the paſſage of the medullar Proceſſes into the Cerebel.

Beſides we may take notice, that when the animal Spirits are carried out of the oblong marrow into the greater natiform Prominences to be derived towards the Cerebel, they, according to their cuſtom, (as often as they tend towards the common Senſory from a double Organ of any Faculty) ought to be confounded and mingled together before they enter the Cerebel: wherefore both the firſt Prominences, and alſo the ſecond growing to them are joyned together with certain Proceſſes like wings reaching one another; which connexion indeed of them, becauſe it ought to be diſtinguiſhed every where from the medullar Trunk lying under it, hence, from the ſeparation or empty ſpace that comes between the oblong marrow and the growing together of the Prominences, that cavity ariſes, which is by ſome called the fourth Ventricle, and by others the paſſage to it.

If it be yet farther inquired, to what end the animal Spirits are carried by this by-paſſage from the common paſſage of the oblong marrow into the Cerebel, and thence back again; I ſay, that this is done for a twofold reſpect, *viz.* both that the Paſſions or Affections of the ſenſitive Soul, begun from the brain, may be tranſmitted to the *Præcordia* and *Viſcera*; then ſecondly, that the natural Inſtincts, excited in the *Præcordia* and *Viſcera*, might be communicated to the brain. Theſe reciprocal commerces which are had between the Brain and the Organs of involuntary Functions, ought to be inſtituted or performed by this private paſſage, leſt otherwiſe the exerciſes of theſe involuntary Faculties ſhould very much diſturb the acts of the outward Senſes, or the intentions of ſpontaneous motions.

As to the firſt, it is obſerved, that by every paſſion of the ſenſitive Soul, as from Anger, Sadneſs, Pleaſure, and other Affections, the *Præcordia* are diſturbed, whether we will or no; which variouſly dilate or conſtrain themſelves, and ſo ſtir up in the blood divers fluctuations. Moreover, from this kind of force of the Paſſions the countenance or the aſpects of the Face are wont to be altered and diſtorted after various ways. The reaſon of all theſe ſeems to be, becauſe when the animal Spirits, exiſting within the Brain, are moved according to the Idea of the conceived Paſſion, the other Spirits alſo flowing within theſe diverting places, being in like manner moved, affect the Cerebel, and that coming between, the original of the Nerves, ſerving to the *Præcordia*, *Viſcera*, and Muſcles of the Face, and ſo the parts to which thoſe Nerves are diſtributed, are alſo ſtirred up or provoked into motions anſwerable to the ſame paſſion.

But the aforeſaid Prominences and their dependences ſerve no leſs alſo for the conveying of the impreſſions of natural Inſtincts to the Brain, that from thence the Appetite and local motions might preſently be retorted; by which all the exigencies or wants perceived by the *Præcordia* or *Viſcera* might be ſupplied. When in a young one newly born the ſtomach crys out for hunger, the Inſtinct of this is carried by the paſſage of the Nerves to the Cerebel, and from thence by the medullar Proceſſes to theſe Protuberances; and the Spirits there inhabiting, form the Idea of the Impreſſion, and carry it to the brain, wherein preſently, without any previous knowledge or experience, ſuch kind of conceptions of the Soul are ſtirred up, that every little living Creature preſently ſeeks out the Mothers breaſts and ſucks.

But it may be objected, it does not ſeem of neceſſity we ſhould ſuppoſe theſe kind of acts of the Paſſions and Inſtincts to be made apart in this by-place, for why are not the commerces of the animal Spirits ordained by the influence from the Brain into the Nerves leading to the *Præcordia*, and ſo back again through the common paſſage of the oblong Marrow? But to that it may be readily anſwered, That this reciprocal motion of the Spirits ought to be made through the middle region of the Cerebel, from one ſtage to another for the exerciſe of theſe Faculties: And therefore, (ſince that all manner of communication between the Brain and Cerebel is performed by theſe Prominences) there ſhould alſo be had a paſſage by the ſame way between this and the Organs of the Functions merely natural. Beſides, if the rage or furious motions of the Paſſions and Inſtincts ſhould be carried in the ſame path in which the forces of ſenſible things are carried, their acts might be greatly confounded by the mutual meeting or gathering together of the animal Spirits. But this kind of Hypotheſis concerning the Acts and Progreſs of the Paſſions and natural Inſtincts, ſhall be made more clear afterwards, when we deſign the Actions and Uſes of the Cerebel, and of the other parts, which in like manner ſeem to be deſtinated to the ſame offices with theſe Protuberances.

In the mean time, what we have affirmed, that the latter Prominences are only Additionals or Excreſcences of the former, will clearly appear to any one beholding them. But this, as we have already hinted, is ſeen without Controverſie in the brains of a Calf, a Sheep, and ſome other four-footed beaſts; where, when the *Nates* are ſignally great, the *Teſtes* grow to the ſame in a very ſmall bulk. Further, that the medullary Proceſſes lead from theſe into the Cerebel, and convey the animal Spirits by this by-path, is ſo manifeſt, that none who hath carefully beheld theſe parts, can be able any further to hetitate or be doubtful of it. For indeed the little hairs or fibres wherewith theſe proceſſes, aſcending into the Cerebel, are marked, are otherwiſe figured and placed than thoſe which are beheld in the neighbouring proceſs deſcending from the Cerebel towards the oblong Marrow.

Moreover, either pair of Prominences do not only communicate among themſelves mutually by their ſtretched out wings, but alſo another medullar Proceſs, going croſs-wiſe, knits together the aforeſaid Proceſſes ſtretched out from thence into the Cerebel; and from this joyning together of them two ſmall Nevres are produced, which bending down on either ſide, and being carried forward, enter the *Dura Mater*, and ſo go ſtraight through it, till having reached to the moving Nerves of the Eyes, they go forth of the Skull at the ſame hole with them, going forward, ſtraight to the Throchlear Muſcle of the Eye. Concerning theſe little Nerves it is obſerved, that when many others proceed from the ſides or the Baſis of the oblong Marrow, theſe ariſe from the aforeſaid Prominences in the bunching forth at the top. The reaſon of which, if I be not miſtaken is this: We have affirmed, that theſe Prominences do receive and communicate to the Brain the natural inſtinct delivered from the Heart and Bowels to the Cerebel; and on the other ſide, or back again, do transfer towards the *Præcordia*, by the mediation of the Cerebel, the forces of the Paſſions or Affections received from the Brain; but in either action the motion of the Eyes is affected with a certain manifeſt Sympathy. For if pain, want, or any other ſignal trouble afflicts the *Viſcera* or the *Præcordia*, a dejected and caſt down aſpect of the Eyes will declare the ſenſe of its trouble: when on the contrary, in Joy, or any pleaſant Affection of the *Præcordia* or *Viſcera*, the Eyes are made lively and ſparkle again. In like manner, the Eyes do ſo clearly ſhew the Affections of the Mind, as Sadneſs, Anger, Hatred, Love, and other perturbations, that thoſe who are affected, though they ſhould diſſemble, cannot hide the feeling and intimate conceptions of the mind. Without doubt theſe ſo happen, becauſe the animal Spirits, tending this way and that way in this diverting place between the Brain and the *Præcordia*, do at once ſtrike thoſe Nerves as the ſtrings of a Harp. Wherefore from this kind of conjecture which we have made concerning the uſe of theſe Nerves, we have called them Pathetical, although indeed other Nerves alſo may deſerve this name.

There yet remains for us to take notice of the aforeſaid Prominences, that either of theſe pairs, and the Proceſſes hanging on them, are diſtinguiſhed from the Trunk of the oblong Marrow lying under by the Cavity between them; ſo that this Cavity or *Ventricle* ſeems to exiſt only ſecondarily, becauſe the empty ſpace between the aforeſaid bodies, placed above and beneath, ſeparating the ſame one from another, ought to come between. But this Cavity ſeeming to reſult ſo by accident, hath a very ſignal uſe; for in the middle of its paſſage a ſloping aperture reaches towards the Tunnel, through which the humors ſliding into either of its holes, one made more forward, the other more backward, are ſent out. The more forward hole is placed between the chambers of the Optick Nerves, a little before the Pineal Glandula, into which the ſerous heap being laid up nigh to the confines of the oblong Marrow, ſlides by degrees: but the other hole is opened more backward into the fourth *Ventricle* which is planted under the Cerebel; which hole is covered with a thin Membrane, which girding about its mouth and that of the Cerebel, provides leſt the humors, derived from the fourth Ventricle, or the confines of the Cerebel, ſhould fall down any other way than into that hole; but if at any time that little hole be broken aſunder by a deluge of the Serum, the watry *Latex* ſliding down upon the Baſis of the oblong Marrow, overwhelms the origines of the Nerves, and ſo brings Convulſive diſtempers and meltings, and not ſeldom deadly, of the vital Spirits, as I have obſerved in the bodies of many dying of Cephalick Diſeaſes.

CHAP. XV.

Of the Uſes of the Cerebel, and ſome of its Parts and Proceſſes.

HAving hitherto continued the former Tract of the oblong Marrow, which as it were the Kings High-way, leads from the Brain, as the Metropolis, into many Provinces of the nervous ſtock, by private receſſes and croſs-ways; it follows now that we view the other City of the animal Kingdom. The ſituation of this being remote enough from the former, its kind of ſtructure is alſo different from it: yea it ſeems that there are granted to this, as to a free and municipal City, certain Priviledges and a peculiar Juriſdiction.

The Cerebel is placed a little below the orbicular Prominences in the hinder part of the Head; where growing to the Trunk of the oblong Marrow by a double little foot, it appears almoſt of a Spherical figure. Its ſuperior gibboſity coheres towards the ſuperficies to the border of the Brain by the intervention of the *Pia Mater*; but nevertheleſs it is intimately united to it, nor is there any immediate commerce between this or that or their parts. There hath been ſpoken enough already of the figure and ſituation of the Cerebel, and of its various Proceſſes, and how it is faſtned to the oblong Marrow; it now remains that we proceed to deſign or draw out the offices and uſes of it, and its ſeveral parts. Where in the firſt place ſhall be inquired into, what kind of office the Cerebel is endued with in the animal œconomy; then when we ſhall deſcend to particulars, there are more things worthy to be noted, which will offer themſelves

ſelves to our conſideration: *viz.* firſt the infoldings of the Veſſels covering the whole compaſs of the Cerebel, and eſpecially its hinder part, with the heap of Kernels; ſecondly, its folds and lappets ordained with a certain and determinate ſeries, and almoſt after a like manner in all: thirdly, the double ſubſtance of the folds, *viz.* cortical and marrowy: and the concentring of all the medullary tracts in two large Marrows or middeſts: fourthly, either little foot or pedeſtal of the Cerebel made out of thoſe two middle *Marrows*: and in either pedeſtal three diſtinct medullar Proceſſes to be found: fifthly, the annular Protuberance made by a proceſs of the Cerebel deſcending into the medullar Trunk: ſixthly, ſome Nerves, which ariſing immediately from this Protuberance and other Nerves in the neighbourhood, which being deſigned for the involuntary Function, receive the influences of the animal Spirits from the Cerebel: Laſtly, the Ventricle or Cavity lying under the Cerebel ought to be conſidered.

1. As to the office or uſe of the Cerebel in general: nothing of it occurs, ſpoken by the Ancients, worthy its fabrick, or agreeable to its ſtructure. Some affirm this to be another Brain, and to perform the ſame actions with it: but if any one ſhould have a ſoft and fooliſh Brain, I greatly doubt, if he ſhould become wiſe, though he ſhould obtain perhaps a more hard and ſolid Cerebel. Others place the Memory in this part, ſuppoſing the Cerebel to be as it were a Cheſt or Box, wherein the Idea's or Images of things, before laid up, are kept apart from the incourſe of freſh Species. But it is far more probable, that this faculty reſides in the *cortical* Spires of the Brain, as we have elſewhere ſhewn. For as often as we endeavour to remember objects long ſince paſt, we rub the Temples and the fore-part of the Head, we erect the Brain, and ſtir up or awaken the Spirits dwelling in that place, as if endeavouring to find out ſomething lurking there; in the mean time, there is perceived nothing of endeavour or ſtriving motion in the hinder part of the Head. Beſides, we have ſhewn, that the Phantaſie and Imagination are performed in the Brain; but the Memory depends ſo upon the Imagination, that it ſeems to be only a reflected or inverſe act of this: wherefore that it ſhould be placed with it in the ſame Cloiſter, to wit, in the Brain, is but neceſſary; for it plainly appears, that there is no immediate commerce between the Brain and the Cerebel.

When ſome time paſt I diligently and ſeriouſly meditated on the office of the Cerebel, and revolved in my mind ſeveral things concerning it, at length, from the Analogy and frequent Ratiocination, this (as I think) true and genuine uſe of it occurred; to wit, that the Cerebel is a peculiar Fountain of Animal ſpirits deſigned for ſome works, and wholly diſtinct from the Brain. Within the Brain, Imagination, Memory, Diſcourſe, and other more ſuperior Acts of the animal Function are performed; beſides, the animal Spirits flow alſo from it into the nervous ſtock, by which all the ſpontaneous motions, to wit, of which we are knowing and will, are performed. But the office of the Cerebel ſeems to be for the animal Spirits to ſupply ſome Nerves; by which involuntary actions (ſuch as are the beating of the Heart, eaſie Reſpiration, the Concoction of the Aliment, the protruſion of the Chyle, and many others) which are made after a conſtant manner unknown to us, or whether we will or no, are performed. As often as we go about voluntary motion, we ſeem as it were to perceive within us the Spirits reſiding within the fore-part of the Head to be ſtirred up to action, or an influx. But the Spirits inhabiting the Cerebel perform unperceivedly and ſilently their works of Nature without our knowledge or care. Wherefore whilſt the Brain is garniſhed as it were with uncertain Meanders and cranklings turnings and windings about, the compaſs of this is furniſhed with folds and lappets diſpoſed in an orderly ſeries; in the ſpaces of which, as in deſigned Orbs and Tracts, the Animal Spirits are expanded according to the Rule and Method naturally impreſſed on them. For indeed thoſe in the Cerebel, as it were in a certain artificial Machine or Clock, ſeem orderly diſpoſed after that manner within certain little places and boundaries, that they may flow out orderly of their own accord one ſeries after another without any driver, which may govern or moderate their motions. Wherefore foraſmuch as ſome Nerves perform ſome kind of motions according to the inſtincts and wants of Nature, without conſulting the government of the will or appetite within the Brain, why may it not be imagined, that the influence of the Spirits is derived wholly from the Cerebel for the performing of theſe? For it ſeems inconvenient, that for theſe offices which ſhould be performed without any tumult or perturbation, the Spirits ſhould be called out of the Brain, which are continually driven into fluctuations as it were with the winds of Paſſions and Cogitations.

As I only imagined of the uſe of the Cerebel after this manner, I was led to it at length by a certain thread of Ratiocination; to which afterwards happened an Anatomical inſpection, which plainly confirmed me in this Opinion. For in the frequent Diſſection of the Heads of ſeveral ſorts of Animals certain Obſervations did occur, which ſeemed to put this matter out of all doubt. For I firſt obſerved, the pairs of Nerves, which did ſerve to the Functions, wont to be performed by the Inſtinct of Nature, or the force of the Paſſions, rather than by the beck of the will, ſo immediately to depend on the *Cerebel*, that from thence only the influence of the Animal Spirits ſeems to be derived into their origines or beginnings. By what means the Nerves ariſing from the *Cerebel*, or receiving from it the proviſion of the animal Spirits, do perform only involuntary actions, ſhall be declared hereafter; in the mean time, for the confirmation of this Opinion, we have in readineſs another Reaſon of no leſs moment.

Therefore

Therefore ſecondly, we took notice, that not only the conformation or make of the Cerebel was ordained after a certain and peculiar manner, that is, that its frame or bulk was couched together with folds or little circles, diſpoſed in a certain diſtinct ſeries, and apt method, and proportionate within themſelves, as hath been ſaid; whence it may be argued, that the Spirits ariſing from hence, and flowing outwardly, are imployed or beſtowed on ſome certain works determinate to one thing. But further it is obſerved, that in all Animals, although they differ in form and kind, yet the figure of the Cerebel is always very like or wholly the ſame. The Brain and oblong Marrow are figured in many after a divers manner; for as we have ſhewed before, there is ſome difference of theſe parts found in man and four-footed beaſts; but between either of theſe, and Fowls and Fiſhes, there is a notable difference as to theſe parts. Notwithſtanding in all theſe the Cerebel, furniſhed wholly with the ſame lappets or little circles alike infolded one in another, is marked with the ſame form and proportion; which certainly is a ſign that the animal Spirits in this work-houſe are begotten and diſpenſed, as it were by a certain dimenſion, for certain neceſſary offices, which are performed in all after the ſame manner; and which cannot be any other than the motions and actions of the *Viſcera* and *Præcordia*. As to the other Faculties, of which ſort are Imagination, Memory, Appetite, yea local motions and ſenſe are exerciſed after one manner in thoſe living Creatures, and after another manner in others; wherefore their brains are formed after a divers manner. But the motions of the Heart and Reſpiration in all endued with an hot blood, are performed after a like manner, that is, with a perpetual viciſſitude of *Syſtoles* and *Diaſtoles*. Beſides, another office is to be aſſigned to the Cerebel, and different from what is convenient or agreeable to the Brain; becauſe where the folds and turnings are wanting in the Brain, they are conſtantly found in the Cerebel. Beſides theſe reaſons drawn from Anatomy, the Pathology of the humane Body affords many others, which confirm the aforeſaid office of the Cerebel. For it oftentimes happens that cruel and horrid Symptoms infeſt the *Præcordia* and the region of the middle or loweſt Belly; whilſt in the mean time, the morbifick cauſe lyes in the Cerebel, or nigh its confines. I have known ſometimes men labouring only in appearance with a Dyſcraſie of the hinder part of the Head, who complained of frequent Swooning and repeated meltings of the Spirits or Deliquiums, as if they were juſt dying: in whom notwithſtanding nothing more could be detected of the morbifick cauſe or its ſeat, but that the Patient perceived a great heavineſs and pain in the hinder part of the Head, and that upon any ſudden motion or bending back of the Head, they were ready to dye. In truth, the Symptoms which are wont to be raiſed up in the diſtemper called the *Incubus* or Night-mare, *viz.* loſs of ſpeech, and a mighty weight or load that ſeems to lye upon the breaſt, proceed altogether from the morbifick matter fixed in the confines of the Cerebel, and obſtructing the paſſages of the Spirits deſtinated for the *Præcordia*. But indeed this Hypotheſis of the office of the Cerebel ſhall be more illuſtrated and confirmed from the uſes of its ſeveral parts, being rightly deſigned or drawn forth.

As to the parts and accidents of the Cerebel, 1. we take notice, that the infoldings of the Veſſels every where cloath the Cerebel no leſs than the Brain, alſo that the ridges and furrows of its folds intimately hide or cover it, which certainly is a ſign that the animal Spirits are begotten in this other work-houſe of them from the watering blood, and inſtilled into its ſubſtance: which thing alſo more clearly appears, becauſe the Arteries and Veins are not only variouſly complicated in the ſuperficies of the Cerebel, but both of them in like manner as in the Brain, ſend forth frequent ſhoots into its more inward ſubſtance; wherefore whilſt the moſt ſubtil and ſpirituous part of the blood being carried through long windings about, and as it were ſerpentine chanels of the Veſſels, and ſo ſublimed into Spirits is received within; the bloody part is carried away by the ſhoots of the Veins ſent alſo deeply down. Further, even as the more watry portion of the blood, deſtinated for the Brain, runs into the *Choroeidal* infolding; (whereby it may there lay aſide its unprofitable Phlegm into the Glandula's) ſo for the ſake of ſeparating the Phlegm an heap of Glandula's, with the foldings of the Veſſels, as it were a Receptacle fitted for this buſineſs, is placed in the hinder Region of the Cerebel.

2. From the blood, after this manner cleared from Phlegm, and made ſubtil by a long circulation, very pure and ſpirituous liquor is inſtilled into the cortical ſubſtance of the Cerebel, which is preſently exalted by the Ferment there placed into animal Spirits. For indeed we have affirmed, that the Spirits are procreated only in the cortical part of the Cerebel, as in that of the Brain: wherefore, becauſe this kind of Cortex is wanting to the oblong and ſpinal Marrow, we think theſe parts do ſerve only for the exerciſe of the animal Spirits, and not for their production.

3. The Spirits every where produced within the cortical or exterior compaſs of the Cerebel, in which they are preſently prepared for the work of the animal Function, are derived from all the folds into the medullar tract, and thence into two ample middle Marrows; where they keep full as it were the fountain or ſpring, and there like the bubling up of waters, are circulated within with a perpetual turning and from thence they continually ſtream forth into the parts of the nervous Syſtem proper to themſelves.

4. As to the ways of Emanation it is obſerved, that the two middle Marrows of the Cerebel paſs as it were into two pedeſtals or little feet, by which they are faſtned to the trunk of the oblong Marrow; and for that in either lilttle foot of it three diſtinct medullar Proceſſes are found, all theſe, or at leaſt two of them, are as it were ſo many paths whereby the animal Spirits ſtream forth from their fountain and flow back a gain.

5. The

5. The firſt of theſe Proceſſes aſcends into the Cerebel from the orbicular Prominences, the uſe of this we have already declared; to wit, that there may be a certain paſſage between theſe Prominences and the Cerebel, in which, whilſt the animal Spirits, as in a by-path, move this way and that way, to and fro, they may tranſmit both the force of the Paſſions from the Brain by the interpoſition of the Cerebel to the *Præcordia*, and convey alſo the natural Inſtincts delivered to the Cerebel from the *Præcordia* and *Viſcera* towards the Brain. But the ſecond Proceſs deſcending ſtraight from the Cerebel, embraces the medullar Trunk, and ſo going round about it, conſtitutes the annular or ringy Protuberance, out of which the fifth, ſixth and ſeventh pair of Nerves take their originals; ſo indeed, that this Protuberance ſeems to be the Ware-houſe or Store-houſe of the Spirits flowing from the Cerebel, from which they may influence and be derived into the oppoſite paſſages of the Nerves. Laſtly, the third proceſs of either little foot, deſcending from the Cerebel into the oblong Marrow, is inſerted into its Trunk over againſt where the eighth pair of Nerves have their Original: ſo that it ſhould ſeem very likely, the proviſion of the Spirits deſtinated for this Nerve is derived alſo by this way from the Cerebel; then what Spirits ſuperabound, remaining longer than this Nerve requires, they ſliding down into the common belly or chanel of the oblong and ſpinal Marrow, increaſe the plenty of thoſe parts. For this ſame end the ſmooth and pyramidal bodies are reached out of the annular Protuberance above the oblong Marrow towards the Spine, to wit, that by the paſſage of thoſe Proceſſes the Spirits of that proviſion or ſtock ſuperabounding, might flow out partly into the beginning of the eighth pair, and partly into the common tract of the medullar Trunk.

Thus much we have ſpoken briefly and ſummarily of the Uſes of the Cerebel, and of its parts and Proceſſes. But that it may be the better underſtood, and alſo that this new thought of Theory concerning the involuntary Function of the animal Regiment, may be more clearly illuſtrated, we ſhall here give you a more particular Order or Method of the Spirits brought forth in the Cerebel, and as it were take a view of, or muſter their Arms or Forces. Further, it will ſeem to the purpoſe, that we ſhould deſign or draw forth more openly the abundance or plenty of the Nerves receiving their gifts from this Fountain of the Spirits concerning the Acts to be performed only of the involuntary Function.

CHAP. XVI.

Of the various Order and diverſe manner of Exerciſe of the Spirits produced in the Cerebel for the Acts of the involuntary Function.

AFter having ſhewn, that the office of the Cerebel is to procreate animal Spirits apart from the Spirits begotten in the Brain, and to diſpenſe them into the Nerves, the Executors of the involuntary Actions and Paſſions; there yet remains to be unfolded by what manner of œconomy or government the Spirits inhabiting the Cerebel and made free, are buſied both by an inteſtine Circulation, within their proper dwelling places, and are wont to be expanded and flow out with an exterior irradiation for the neceſſities and wants of other parts: then theſe things being ſhewn, we ſhall deſign more particularly the Uſes and Offices of the Nerves, and of ſome other Proceſſes doing ſervice to this Government.

As to the firſt, as the Cerebel is the other primary Root of the ſenſitive Soul, or the Fountain from whence the animal Spirits, being diffuſed through the whole ſubſtance of it and its Appendix, are continued ſtill under the ſame ſyſtaſis and radiant Contexture, it is to be noted, that this radiation of the Spirits from the Cerebel doth flow after another manner than the other from the Brain: becauſe this being left to it ſelf, is beſtowed by a conſtant efflux or flowing out on the Organs both of the vital Function and the merely natural, and its expences by an equal continual proviſion of Spirits, are made up again from the bloody maſs continually inſtilled in. But on the contrary, the Spirits flow out from the Brain, neither by ſuch a continual courſe without intermiſſion and by little and little, nor are ſuſtained by a perpetual proviſion and ſliding in by degrees; but both the loſs of them, and their refection, are uncertain, unequal, and variouſly interrupted. For neither are the ſpotaneous Acts of the Function it ſelf, to which they ſerve, performed after any conſtant or always the ſame manner; but according to exterior accidents and occations we put them forth by heaps, and with a certain force ſometimes, and again ſometimes we ſuffer them to be wholly intermitted and unimployed. Therefore the Spirits alſo are in like manner ſupplied with an uncertain meaſure; to wit, they are inſtilled in ſleep plentifully and more copiouſly, but waking more ſparingly and with hard labour, or ſcarce not at all. Yea the involuntary portion it ſelf of the ſenſitive ſoul (which flows from the *Cerebel*) for that it hath a near commerce and affinity (as was already ſaid) with the other radicated in the Brain, therefore it is wont to be much diſturbed in the performing

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its office equally and peaceably, and being variouſly affected and agitated by the impulſes ſent here and there, or from this place and that, it is compelled, ſometimes to contract, ſometimes to extend its *Syſtaſis* in the whole or in part, and ſo is rendred obnoxious to ſeveral Paſſions, and ordinarily inſtigated to the performing irregular and diſorderly actions.

But indeed the contexture of the Spirits, or the part of the Soul irradiating the Cerebel and its Appendix, is both affected with a certain ſenſe, and is urged into motions appropriate to it ſelf, though divers. The ſenſe or Sympathy belonging to this, if it be terminated within the confines of the Cerebel, is always private, nor goes any farther forward to the Brain with a more ſtrong undulation or wavering; and becauſe it is performed the living Creature knowing nothing of it, unleſs by the effect it cannot be known, for that it excites a peculiar motion. But ſuch an affection of the Cerebel is implanted in it, that by every new diſpoſition of the *Præcordia* and *Viſcera* communicated to this from beneath, alſo from every violent paſſion excited within the *Forum* of the Brain, and ſo ſent from above, a certain impreſſion is carried to the inhabitants of the Cerebel: by which indeed they are diſpoſed into various ordinations for the performing theſe or thoſe motions reſpectively.

For examples ſake, ſo long as the tranquil region of the Cerebel, like a ſerene and fair Heaven, is free from all perturbation, the Spirits its inhabitants, being poured out with a pleaſing ſenſe, or as it were a certain complacency, flow within their proper habitations, both with a gentle circulation, and alſo with an equal flowing out enter the beginnings of the Nerves ſerving to the Functions both vital and natural: by which indeed eaſie Reſpiration, the Pulſe, Chylification, and other offices of the ſame nature, are performed peaceably. But if that any trouble or moleſtation happen outwardly to any one, from whence an impreſſion of it is communicated to the Cerebel, preſently a troubleſome ſenſe being ſtirred up there, it diſturbs the animal Spirits in the Fountain it ſelf, and ſo is wont to excite irregular motions in the Organs of the involuntary Function. For from hence the frequent alteration of the Pulſe and of Reſpiration, alſo Cramps of the *Viſcera*, and convulſive motions ariſe unknown to us, or alſo againſt our wills. But an impreſſion ſent from elſewhere to the Cerebel, and inducing the ſame kind of a troubleſome ſenſe, either aſcends by the paſſage of the Nerves from the *Præcordia* and *Viſcera*, or it is carried from above from the Brain by the paſſage of the orbicular Prominences; as ſhall be ſhewn more largely anon.

In the mean time, from theſe things already ſhewed of the paſſive power or ſenſe of the Cerebel, it may be eaſily collected, by what means, with what order and ſeries the animal Spirits, ariſing from the ſame, are moved. But firſt you muſt diſtinguiſh between their twofold motion. For one is cuſtomary and ordinary, conſiſting in a perpetual and equal efflux of Spirits; by which indeed, they flowing into the beginnings of the Nerves nigh their riſings, eſpecially of the intercoſtal and wandring pair, the ſolemn acts of the Pulſe, Reſpiration, Chylification, and others of the involuntary Function are performed. Then ſecondly, the other motion happens extraordinary and occaſional, which the ſame Spirits perform confuſedly, as it were in diſturbed orders: as when the Pulſe becomes quicker or ſlower than it ought, or the Reſpiration unequal or interrupted; and when the other Faculties, which belong to this Claſs, are perverted from their regular and conſtant manner. But theſe kind of extraordinary motions are again twofold, to wit, for that its inſtigation proceeds from a double bound; for the impulſe whereby the Spirits inhabiting the Cerebel, are compelled into an irregular action, (as we have but now intimated) is carried either from beneath, *viz.* from the *Præcordia* and *Viſcera*; or it is wont to be tranſmitted from above, to wit, from the Brain.

As to the firſt, if at any time the *Præcordia* grow too hot, and are burnt with a feveriſh heat, preſently by the paſſage of the Intercoſtals and the wandring pair of Nerves, the Spirits reſiding in the Cerebel, being warned of this evil, inſtitute more frequent and ſtronger acts both of the Pulſe and of Reſpiration. In like manner, if by chance the humors and ſharp Juyces irritate or greatly trouble or afflict the Coats of the Ventricles or Inteſtines through the ſenſe of this affection communicated to the Cerebel, the inſtinct of performing the motion is reciprocated, whereby the fibres of the parts, being contracted and wrinkled together, endeavour the ſhaking off of the hurtful matter. More inſtances might be here brought of all the other acts of the vital or merely natural Function, of which beſides it may be obſerved, that when a ſenſe of the trouble is immediately conveyed from the *Præcordia* or *Viſcera* to the Cerebel, this affection, like the waving of waters, is either ſtopt or terminated there, from whence a motion, as the buſineſs requires, unknown to the Brain, is preſently retorted, as when the actions of the *Præcordia* are altered by a feveriſh diſtemper without our knowledge; or ſecondly, that ſenſe of the trouble being tranſmitted to the Cerebel, for that it is more vehement, it unfolds it ſelf more largely, and like a ſtrong waving of waters, paſſing through the Cerebel, goes forward further even to the Brain, and warns its inhabitants of the evil; by which they being incited to oppoſe the enemy, cauſe a motion of another kind: So (as hath been ſaid) when the *Præcordia* grow cruelly hot, the Cerebel feeling this, makes the Pulſe and Reſpiration ſtronger. But further, the Brain being warned of the ſame trouble, ſeeks and diligently requires cold drink and other remedies to moderate the heat. Moreover, it is after this manner alſo in ſeveral other actions, which though they are regular, yet being made in the Brain without any previous knowledge, they are ſaid to be done by Inſtincts merely natural; as when brute Animals, being newly brought forth, preſently ſeek for the Dams Teats, and greedily ſuck; or Birds, without any ſhewing or Example, build Neſts with wonderful Art, lay eggs, and hatch young ones. In theſe kind of works the Brain being

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taught before by none: directs fit means to the ends instituted by Nature: which indeed seems to be done by this means. The sense of every necessity being brought to the Cerebel, incites the Spirits inhabiting it to succour it; which when they are not able to do, the impression going from thence further forward, is carried to the orbicular Prominences: by which the Spirits there inhabiting, being presently struck, form the Appetite or the intention of performing, which being thence communicated to the Brain, it readily causes that local motions, fit for the executing of the work, be retorted. Of these we shall speak anon a little more largly, when we treat of the respect which happens between the orbicular prominences and the annular Protuberance.

In the mean time, we shall take notice in the second place, that the irregular motions of the Spirits inhabiting the Cerebel, are wont also, by reason of the force of the affections, to be transmitted from thence to the Brain: for as often as a violent passion, as Joy, Sadness, Anger, Fear, or of any other kind, is conceived in the Brain, presently the impression of the same being brought through the by paths of the Prominences into the Cerebel, disturbs the Spirits destinated to the vital or merely natural Function in their very fountain, and for that reason presently induces notable mutations in the Organs of those Functions.

What hath been spoken hitherto of the Cerebel being imployed about the offices of the involuntary Function only, also concerning the sense and the motions both usual and irregular of the Spirits inhabiting it, will be made more clear, if lastly we shall shew the offices of the Nerves and of the other processes, immediately depending upon the Cerebel, to be no other than such as perform only involuntary Acts: which shall be briefly and succinctly done, as far as is pertinent to our purpose, because a more full consideration of them is left to another place.

CHAP. XVII.

Of the Nerves, which receiving the stores or companies of the Spirits from the Cerebel, bestow them on the Acts of the involuntary Function.

WE have already shewed, that out of the annular Protuberance (which is a certain Process of the Cerebel) three pairs of Nerves, to wit, the fifth, sixth, and seventh immediately arise. We have said that Protuberance to be as it were a Repository or Store-house, wherein the Spirits flowing out of the Cerebel, and to be derived into the depending Nerves, as occasion serves, are kept: and in the mean time, whilst they remain there, they who stream out from either middle Marrow of the Cerebel divisively, meeting mutually in this Cirque, are united together. But as the aforesaid three pairs of Nerves receive the forces of the Spirits from the Cerebel by the mediation of that Protuberance; so also the eighth pair having its rise near the insertion of the other (*viz.* the lowest) medullar Process sent down from the Brain, seems to derive by its passage the influence of the Spirits no less from the Cerebel: wherefore when these four conjugations of Nerves owe the Tribute of their Spirits wholly to the Cerebel, if I shall shew that all these Nerves serve chiefly and almost only to the involuntary acts of the Senses and Motions, surely this will be a signal Argument, that according to our Hypothesis, the office of the Cerebel is to beget and to dispense the animal Spirits requisite for the involuntary Functions.

Therefore in the first place we observe of the fifth and sixth conjugation of Nerves, that as this arises out of the Basis of the greater Ring, and that from its sides both in man and in four-footed beasts; the fifth pair being carried more forward, distributes its branches into the Glandula's of the Eyes, into the Nostrils, into the Palate, Teeth, yea and into most parts of the Face and Mouth; but the sixth pair is wholly bestowed on some Muscles of the Eyes. Further, out of the trunk of the fifth pair two shoots, and another out of the Nerve of the sixth pair bending back behind, meet together; and what is wonderful, and not before taken notice of by Anatomists, the intercostal Nerves, destinated to the *Præcordia* and *Viscera*, do make a Trunk; so that the Nerves, of the fifth and sixth pair stretch out a double Ramification, to wit, one more above about the parts of the Mouth and Face, and the other lower through the *Viscera* of the middle and lowest Belly. But it will appear clearly to any one considering this thing more carefully, that the chief branches of either partition are imployed about the involuntary offices of Motion and Sense, of which sort those are chiefly, that either cause the passions, or perform the natural Instincts.

1. Concerning the intercostal Nerve, which (as was said) being radicated in the Nerves of the fifth and sixth pair, depends as to its origine wholly on the Cerebel, it is not here to be doubted but that it looking towards the *Præcordia* and *Viscera* in a man, and towards these latter only in most four-footed beasts, is bestowed on the Functions only vital and merely natural, and so confers little or no-

thing to ſpontaneous Actions. Further, foraſmuch as this Nerve reaching forth into *Præcordia* and *Viſcera* of the whole Abdomen, is continued by its ſuperior ramification alſo into the Eyes, as alſo into the parts of the Mouth and Face; certainly from hence a true and genuine reaſon may be given wherefore in every paſſion the Eyes, Face, and Mouth do ſo correſpond with the affections of the *Præcordia*, often unknown to us or againſt our minds, that oftentimes we are compelled to betray the moſt intimate ſenſe of the Heart by the continuance and aſpect. Yea, hence a reaſon may be brought, why in ſneeſing, yawning, laughing, and crying the Muſcles of the Face conſpire ſo in motion with the *Præcordia*. Beſides, when in man different from any other living Creatures beſides, as we ſhall ſhew afterwards, many ſhoots are ſent from the intercoſtal Nerve to the Nerve of the Diaphramga; this certainly is the cauſe why riſibility is the proper affection of man.

But the Trunk of the fifth pair being carried more forward, and diſtributing its branchings through the parts of the whole Face, cauſes the ſame not only to be pathetically moved, and figured according to the affections of the *Præcordia*; but alſo produces ſome acts, both of motion and ſenſation, of another kind, which for the moſt part are involuntary, and ſo ſeem to depend wholly upon the Cerebel immediately. For example, this Nerve imparts ſhoots to either mandible requiſite for the buſineſs of chewing: but it is very well known, that the taking in of the food at the mouth is the firſt and oldeſt buſineſs of every Animal, which indeed is taught by natural Inſtinct before any knowledge of the Brain. But as to the Senſes, the branches of this pair conduce ſomething to the ſmelling, but for the moſt part for the knowing and chuſing of ſavors. Hence it comes to paſs, that as odors refreſh the Brain by the ſmelling Nerves, ſo alſo they affect the Cerebel by the branch of this pair, and are wont by that means to recreate the *Viſcera* and *Præcordia*. But ſapors or taſtes (for that they are almoſt the peculiar Province of this) carry whatſoever they have of pleaſantneſs or trouble, firſt to the Spirits inhabiting the Cerebel, and then by their conſent to the *Præcordia* and *Viſcera*. Hence it is, that a Pectoral not only allays hunger, but the very firſt taſting of Wine raiſes up thoſe that are fainting or ſwooning away. Moreover, foraſmuch as from this Nerve certain branches ſerve for the taſte, and others for the ſmell, there is contracted ſo ſtrict an affinity between either of theſe Senſories, that nothing pleaſes the taſte unleſs it be approved of by the ſmell: and the loſs of one of theſe ſenſes oftentimes cauſes the privation or the diminution of the other.

2. Concerning the Nerve of the ſixth conjugation we obſerve, that as one ſhoot is bent back for a root of the intercoſtal Nerve, the remaining Trunk of it being carried forward towards the ball of the Eye, is diſtributed to two of its Muſcles, *viz.* to the ſeventh, proper to beaſts, and to the drawing Muſcle. Hence may be inferred, that this Nerve, beſides the influence of it beſtowed on the vital and natural Function, ſerves alſo for the producing ſome pathetick motions of the Eye, to wit, ſuch as are wont to obey the affections of the *Præcordia* and *Viſcera*; ſo that the whole proviſion of the animal Spirit, which it receives from the Cerebel, it beſtowes only on involuntary acts.

3. The ſeventh pair, or the hearing Nerves, ſeem alſo to depend upon the Cerebel, for aſmuch as they take their originals out of the annular Protuberance: but the uſe of them is a little otherwiſe in man than in four-footed beaſts. For in him the annular Protuberance is one, and that very big, from whoſe lower margin the auditory Nerves proceed: but in Brutes the Protuberance is twofold, *viz.* one greater, ſent down from the Cerebel, in which the beginnings of the fifth and ſixth pair of Nerves conſiſt; then near this there is another leſſer, and as it were ſecondary, from which the auditory Nerves proceed. This leſſer and lower Ring doth not ſo manifeſtly depend on the Cerebel, as the former; but there is ſtretched out from either height of it a white medullar line upon the oblong Marrow in the bottom of the fourth Ventricle: ſo as this ſeems to receive either the Spirits from the oblong Marrow, or at leaſt to carry into the ſame the ſenſible Species: for what uſe it is ſo conſtituted ſhall be inquired into afterwards; for concerning theſe Nerves of the ſeventh pair, foraſmuch as ſome offices of them very much illuſtrate the goverment or œconomy of the Cerebel, we ſhall diſcourſe here a little more largely.

Therefore in man, who hath got a great and undivided annular Protuberance, and auditory Nerves coming out of its margin or brim, ſhews its ſtock received of the Cerebel: by which means we may ſee the tasks of thoſe Nerves quadrate with the aſſigned government of this. We have ſhewn before the Proceſſes (which in a manner may be called diſtinct Nerves) of the ſeventh pair to be twofold on either ſide: one, the ſofter of theſe, ſerves only for the ſenſe, but the other harder ſeems to perform ſome motions. This latter Nerve, being carried without the Skull, is divided into three branches, all which ſerve to pathetick motions, or at leaſt to ſuch as are performed without conſulting the Brain.

1. The firſt of them being bent back towards the auditory paſſage, is beſtowed on the Muſcles of the Ear. Without doubt, by the action of this, it is effected, that all Animals at the ſudden impulſe of a ſound or noiſe, erect their Ears as it were to catch the ſound too ſoon paſſing by. 2. The other branch of this ſame Nerve climbing over the Muſcles of the Jaw, ſends forth ſhoots towards either corner of the Eye: which are inſerted into the muſcles lifting up the Eye-lids; the office of which is certainly to open ſuddenly the Eyes at the ſudden approach of any ſound, and as it were to call them forth to watch, that by the ſtroke of the Air being brought to the Ear, the Eye might preſently look about to ſee what is the matter, and whether there might be any danger near or not: which alſo all creatures do unthought of. 3. The third branch of the ſame auditory Nerve deſcending towards the root of the Tongue, is diſtributed to its Muſcles, and to thoſe of the Bone *Hyoides*, and ſo actuates ſome of the Organs for the framing

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the Voice. For this reaſon in ſome meaſure it comes to paſs, that living Creatures being aſtoniſhed at an unaccoſtomed or horrid ſound, preſently putting forth an uncertain voice, cry out and make a noiſe. But the conformation of theſe kind of Nerves in man ſerves for another more noted uſe, to wit, that the voice might fitly anſwer to the hearing, and that this might be ſet as the Echo of the ſound admitted by this: ſo indeed, as on the other ſide, there be two Nerves of the ſame pair, the ſound is received by the hearing, through one, which is rendred again by the voice through the other. The common and extrinſick Echo conſiſts in this, that a certain undulation or waving of the Air ſhaken or moved, being ſtirred up, and tending towards or about, when by reaſon of ſome ſtop or hinderance, it cannot go any further directly, being preſently repercuſſed or ſtruck back or reflected at certain angles, it is terminated contrary to the former bound. In like manner, in the hearing, the impreſſion of the ſound, or the Species admitted to the Ears by the hearing faculty of the Proceſſes of the ſame or neighbouring Nerve, and being carried inwardly towards the Cerebel and common Senſory, and from thence again reflected on the vocal proceſs, it is carried out by the Mouth. But between theſe there is ſome difference, to wit, foraſmuch as the outward Echo renders back the ſound immediately; but the ſound of the Hearing is not neceſſarily carried forth at the mouth preſently, but that this leaves an Idea in the Head, according to which afterwards, as occaſion ſerves, the voice is formed, which bears the type and image of that, though ſome time before admitted.

But here (if I may digreſs a little) we ſhould inquire in what part of the Head the Ideas of ſounds are left: whether only in the Brain, which is the Cheſt of Memory accquired as it were artificial, or whether not alſo in the Cerebel, which is the place of natural memory? Truly we ſuppoſe, that ſounds belong to both theſe, as it were to diſtinct Store-houſes. Every audible impulſe being ſtruck againſt the Ear, it is preſently carried by the paſſage of the auditory Proceſs to the annulary Protuberance; but from thence it is carried, as other ſenſible Species, to the chamfered bodies or the common Senſory; (which way it paſſes thither, ſhall be ſhewed afterwards) this impreſſion tending from thence farther, and being alſo delivered to the Brain, ſtirs up the Imagination, and ſo leaves in its Cortex an image or private mark of it ſelf for the Memory. Further alſo, as the auditory Proceſs depends on the Cerebel, and receives from it the proviſion of the animal Spirits: ſo it is moſt likely, that by the receſs of the ſame Spirits the Ideas of the Sounds are conveyed alſo to the Cerebel; which forming there footſteps or tracts, impreſs a remembrance of themſelves, from whence when afterwards the Species there laid up are drawn forth by the help of the vocal proceſs, voices, like the ſounds before admitted, and breaking forth in a certain ordained ſeries, come to be made.

Hence it is uſual, that muſick or melody is ſoon learnt by ſome men, which afterwards they bring forth with exact Symphony, without any meditation or labour of the Brain; to wit, from the diſtinct accents of the heard harmony, the Spirits moving within the Cerebel are diſpoſed into peculiar Schemes, according to which, when they flow on both ſides into the vocal proceſs of the auditory Nerve, they render as it were with a certain ſpontaneous voice, and like a Machine or Clock with the ſucceſſion of Species, the meaſures or Tunes of the Inſtrument which they had drunk in at the ears. Without doubt hence the reaſon may be ſought, why ſome men learn Muſick without any trouble, and others hardly or not at all. For it is obſerved, that ſome Children, before they can ſpeak diſtinctly, quickly ſing, and remember certain Tunes; whilſt others, though very ingenious men and of excellent memory, are very Fools at Muſick, and become uncapable, as an Aſs for the Harp; wherefore 'tis commonly ſaid, that ſome have muſical ears, and others are wholly deſtitute of that faculty. In the mean time, 'tis to be confeſſed, that in theſe the Organs of the Voice are not defective; but all the fault, though wrongfully, is caſt on the hearing.

But in truth the genuine cauſe of this defect ſeems to conſiſt in this, that when in all, the audible Species go to the Cerebel ſooner and more immediately than the Brain; yet in ſome the Cerebel being harder, and not eaſily yielding to the received impreſſions, thoſe Species, becauſe they could impreſs nothing of themſelves in their paſſing to the Cerebel, being carried towards the common Senſory, leave their Types or Ideas cheifly and almoſt wholly in the Brain: which part being ſtill buſied with diſturbed motions, is leſs apt to keep diſtinctly the compoſures of Harmony. But in the mean time, in others the Species of audible things, beſides that they are carried to the common Senſory and to the Brain, do alſo affect the Cerebel, eſpecially if they are harmonically figured (foraſmuch as in them there is a ſofter capacity of the impreſſions) with a peculiar order and Scheme of the animal Spirits: where, as the Species of the Harmony being diſpoſed in convenient little places and cells are kept, afterwards they flow out from thence, almoſt unthought of, without any endeavour or labour of remembrance, but in a diſtinct ſeries, and as it were in compoſed modes and figures, and ſo by blowing up the vocal proceſſes, they conſtitute ſweet Tunes and vocal Muſick.

If that the divers ways of paſſage are inquired into, to wit, whereby the audible Species, being carried into the annular Protuberance, do get both to the Brain and Cerebel; I ſay it is not improbable, but out of that Protuberance both a paſſage lyes open into the underlying tract of the oblong Marrow, and as it were the high road; as alſo another paſſage is opened into the Cerebel through the medullar proceſſes of the ſame Ring. But leſt there ſhould perchance be a confuſion of the animal Spirits and the ſenſible Species, (which indeed can hardly be avoided) if the way made for their paſſage ſhould lye open into various paſſages and manifold apertures; therefore concerning this it may well be ſuppoſed, that the Ideas of the Sounds paſs through the Cerebel, when they are carried to the common Senſory; which region being firſt

paſt, they are at length brought by a by-path, *viz.* through the orbicular Prominences to the chamfered Bodies: which perhaps is partly the reaſon, that in the Hearing the perception of the ſenſe ſucceeds ſo late, and the impulſe of the object, in reſpect of ſight, follows ſo ſlowly.

Whilſt therefore the audible Species paſſes through the Cerebel, in ſome men, it leaves in this region (for that it is of a ſoft temper, and fit for the receiving impreſſions) and tracts and marks of it ſelf, and ſo they obtain muſical ears. But in others who have a harder frame of the Cerebel, they produce no tracts of the ſame Sounds, and therefore ſuch are wholly diſtitute of the faculty of Muſick.

As therefore we ſuppoſe the audible Species to paſs through the Cerebel after this manner, a reaſon may be given from hence, wherefore Muſick does not only affect the Phantaſie with a certain delight, but beſides chears a ſad and ſorrowful Heart; yea, allays all turbulent Paſſions excited in the Breaſt from an immoderate heat and fluctuation of the blood. For ſince the animal Spirits, ſerving for the motion of the *Præcordia*, are derived from the Cerebel; as the perturbations conceived in the Brain, the influence being tranſmitted hither by moving theſe Spirits, in the Fountain it ſelf, transfer the force of their Affections on the Breaſt; ſo the Melody introduced to the Ears, and diffuſed through this Province, does as it were inchant with a gentle breath the Spirits there inhabiting, and compoſes them, called off from their fury, to numbers and meaſures of dancing, and ſo appeaſes all tumults and inordinations therein excited.

From theſe may in ſome meaſure be known the reaſon of the difference, why the hearing Nerves are after a different manner in man and in four-footed beaſts: for, becauſe in theſe there is little need that the audible Species ſhould paſs through the Cerebel, either for the reciprocations of the ſound heard, by the voice, or for the impreſſing there the Tunes of the Harmony (for neither is Muſick required, what ever Poets feign, to the taming the Affections which move the breaſts of beaſts) therefore in theſe (I mean in four-footed beaſts) the annular Protuberance diſpenſing the animal Spirits to the auditory Nerves, and receiving from them the ſenſible Species, requires not ſo ſtrict an affinity with the Cerebel: yea, whenas in may ſuffice, that thoſe Nerves ariſe from the oblong Marrow, yet the annular Protuberance, as it were a common Porch, ought to be prefixed to them; to wit, in which both the Spirits going out from either ſide, and the ſenſible Species to be carried to either, ought firſt to be mixed and united together, leſt otherwiſe every ſound ſhould become double.

Among the Nerves which are ſeen to belong to the Cerebel, and to perform its offices, laſtly follow the eighth or wandering pair, which indeed hath its riſe out of the common Trunk of the oblong Marrow, near the place where the laſt proceſs of the Cerebel is terminated, and over againſt where the pyramidal bodies, being produced from the annular Protuberance, end: ſo that we think theſe Nerves alſo, by that proceſs coming between on either ſide, and alſo perhaps in ſome meaſure through the paſſage of the pyramidal bodies, do derive all manner of influence of the animal Spirit from the Cerebel.

The beginning of theſe conſiſts of very many fibres and filaments or little threads preſently diſtinct one from another; to which belongs, from the very beginning of every Nerve, a noted Trunk ariſing out of the ſpinal Marrow. The deſcription of the wandring pair of Nerves, and its protenſion into the *Præcordia* and ſome *Viſcera*, are added hereafter. For the preſent it ſhall ſuffice, that we take notice, for that as much as this Nerve is beſtowed chiefly on the *Præcordia*, the acts whereof are involuntary, and are performed without our care or knowledge in ſleep as well as waking; and for that the ſame Nerve ſeems to receive the forces of the Spirits wholly from the nearer fountain of the Cerebel; from hence it may certainly be well concluded, that the government or œconomy of the Cerebel regards only the involuntary Function.

So much for the Nerves, which being ſubjected to the Government and Laws of the Cerebel, ſeem to obey and ſerve under it: among which moreover ought to be placed the fourth pair, or the pathetick Nerves of the Eyes, to wit, which ariſing out of the firſt proceſſes of the Cerebel, come between that and the orbicular Proceſſes; of the uſe of which we have ſpoken already. Further, we ſhall here take notice, that ſome other Nerves to be deſcribed below, for that they communicate with the aforeſaid Nerves near their originals, cauſe alſo ſome involuntary acts to be performed; of which ſort are firſt the ninth pair, the ſpinal Nerve acceſſory to the wandring pair, alſo the Nerve of the Diaphragma, and ſome others, as we ſhall ſhew mor at large in the particular Hiſtory of the Nerves.

We may alſo obſerve, concerning the Nerves but now deſcribed, which owe their ſtock to the Cerebel, and ſeem to be deſigned for the offices of the involuntary Function, that ſometimes ſome of them, though of another Dominion, are compelled to obey the beck and government of the Brain: for we are wont to draw the parts of the Face, uſually moved pathetically and unthought of, and alſo at our pleaſure, into theſe or thoſe Configurations or poſtures: we are able alſo in meaſure to alter the motions and actions of the *Præcordia* and *Viſcera* at the will or command of the Appetite. The reaſon of theſe is, partly becauſe the Nerves of either Government communicate variouſly among themſelves with ſhoots ſent forth one to another, ſo that oftentimes the offices of the one are drawn into the parts of the other. But beſides, we have mentioned before, that the ſenſible impreſſion being inflicted on the parts of the involuntary Function, foraſmuch as it is vehement, like a ſtrong waving of water, paſſing through the Cerebel, affects the Brain it ſelf. In like manner it may be thought concerning the motion which belongs to thoſe parts, *viz.* that made after the ordinary manner, that it is performed by the command of the Cerebel. Notwithſtanding ſome more ſevere Edicts of the Brain, by the by-paſſage of the Prominences, belong

alſo

alſo to the Cerebel, and determine the Offices of the Inhabitants of it to be performed at the beck of the Appetite. As every one ſees that violent Paſſions (whether the will be privy or not) eaſily do this; why therefore may not the will it ſelf alſo, as occaſion requires, exerciſe the ſame dominion? But in the mean time, this derogates nothing from the priviledges of the Cerebel, that it may not be called a free and municipal City, and ſo Miſtreſs of the involuntary Function; for that in ſome few it is after the manner of the Brain: becauſe the Brain it ſelf in many things is compelled to ſerve the Cerebel and its Government, as we have already ſhewn, and is neceſſarily bound to it. For the Brain owes much to the Cerebel, foraſmuch as it receives from the vital Function (which is of its Province) the proviſion of the blood, and by conſequence the Tribute of the Spirits produced of it: ſo indeed that both theſe parts, though Principals, perform mutual offices, and as it were in a circle, require and accompliſh ſervices one for another.

CHAP. XVIII.

Of the relation or mutual reſpect of either Appendix of the Cerebel, to wit, of the anterior, which are the orbicular Prominences; and the poſterior, VIZ. *the Annular Protuberance: Alſo of the remaining portion of the oblong Marrow continued into the Spinal Marrow.*

BEſides the aforeſaid Nerves, to wit, the fourth, fifth, ſixth, ſeventh, and eighth pair which are imployed for the performing the tacit Edicts of the Cerebel for every involuntary Function, and thoſe equal in number to the reſt ſubject to the Brain, that cauſe the Cerebel to have an Empire divided with it; there are alſo ſome Proceſſes and Protuberances, which being placed before and behind the Cerebel, are its Appendixes, that are taken into part of the ſame Office and Miniſtry. The deſcription and uſe of theſe, are already particularly delivered. But for that (as a while ſince we intimated) there happens a certain reſpect or habit between the orbicular Prominences, which is the anterior Appendix of the Cerebel, and the annular Protuberance, which is the other poſterior Appendix of the ſame, and that one part is proportionate to the magnitude of the other; ſo as when the natiform Prominences are greater or greateſt, the annular Protuberance is always ſmaller or ſmalleſt; and on the contrary, they who have this latter in a very great bulk, in them the other is leſſer; and ſo for that either part ſeems to be a peculiar Repoſitory of the Spirits, which belong to the œconomy of the Cerebel, when a greater proviſion of them is laid up in one Store-houſe, therefore there reſides a leſſer in the other; when I ſay there is this kind of conſtant relation found between theſe parts, it yet remains for us to find out for what end this is ſo conſtituted.

Seeing that the animal Spirits are diſpoſed within the ſeveral parts of the Head in diſtinct Schemes of Rays, through which are variouſly tranſmitted, as through Perſpective glaſſes, the impreſſions of ſenſible things and the inſtincts of motions to be performed; it eaſily occurs, that there are commerces had this way and that way in the natiform Prominences between the Brain and Cerebel; and that the Spirits inhabiting the annular Protuberance are *Internuncii* or Meſſengers going between, which transfer the mutual reſpects of the *Præcordia* and *Viſcera*, as alſo of the parts that are wont to be pathetically moved. But if it be inquired into, what kind of commerces and reſpects thoſe are which the Brain carries to the Cerebel, and on the contrary, and that either have to the Organs of the vital and merely natural Function, we ſhall in ſo difficult and very intricate a matter propoſe our Opinion, though with an heſitating and doubtful mind.

We have before intimated, that the orbicular Prominences did deliver to the Cerebel the forces of the Paſſions to be carried from the Brain the *Præcordia*, and did receive from it, and communicate to the Brain the neceſſities of the natural Inſtincts delivered from the *Præcordia* and *Viſcera* to the Cerebel. To theſe moreover we add, that the annular Protuberance ſerves wholly for the ſame offices, though after another manner; to wit, this receives the forces of the Paſſions, as it were at a ſecond hand, from the Deputiſhip of the Cerebel, and tranſfers them then immediately to the *Præcordia*; and this ſeems to be the chiefeſt office of this part. Further, the ſame Ring receives immediately the natural Inſtincts from the *Viſcera* of the middle and loweſt Belly, and impreſſes them on the Cerebel to be conveyed further to the Brain; which kind of uſe it exhibits ſecondarily by affording only a way of paſſage: For indeed ſuch Inſtincts having paſt through the Cerebel, we ſuppoſe to be formed and perfected within the orbicular Prominences, from whence being tranſmitted into the Brain, they draw forth requiſite actions without the previous knowledge of it, or intention of doing.

Hence

Hence it may be ſuppoſed, that the annular Protuberance contains chiefly the animal Spirits which perform the inteſtine commotions of the Affections. In every violent paſſion of the Soul, preſently the *Præcordia* are greatly troubled, to wit, the ſame being variouſly drawn together or ſpread abroad, compel the blood into divers fluctuations; but indeed a great company of the Spirits, ſomewhere got together and ready for Excurſions in a ſet Battel, do perform theſe diſorders and irregular motions of the *Præcordia*; and for that the Spirits can be diſpoſed for this in no other part than here, before the beginnings of the Nerves, conſtituted for theſe offices; therefore this Protuberance in a man, by reaſon of the ragings of the paſſions to be performed by a certain force and incitation, is far greater than in any other Animal. For as he is wont to be ſuddenly and vehemently diſturbed, therefore the Promptuary or Store-houſe is required to be more large, in which a greater plenty of Spirits may be kept, to be beſtowed on ſuch inordinations of the Affections. Next to a man this part is greateſt in a Dog, Cat, and Fox; in a Calf, Sheep, Goat, Hare, and other milder Animals it is very ſmall.

But as the annular Protuberance ſeems to be the chief Organ or Cheſt of the Spirits, from whence the winds of the Paſſions, deſtinated for the exciting the *Præcordia*, are conveyed into the breaſt; ſo we ſuppoſe the orbicular Prominences to be a means of paſſage, and the very inſtruments whereby the inſtincts and neceſſities of the *Præcordia* and *Viſcera* are communicated from the Cerebel to the Brain. Yea, the animal Spirits dwelling in this, as a retiring place, do not only tranſmit theſe kind of Ideas or formal Reaſons of the Inſtincts, but in ſome meaſure form and prepare them for the Brain. For when as ſome brute Animals, whoſe Brain is not imbued with a previous knowledge or practical habits, chuſe and bring forth ſome ſpontaneous actions as it were with judgment and deliberation, certainly we may believe the intentions of theſe kind of acts are ſuggeſted from ſome other place than the Brain, to wit, from the aforeſaid Prominences. Wherefore 'tis to be obſerved, that in ſome Brutes endued with an indocil or dull Brain, the Buttock-like Prominences are greateſt, as may be ſeen in a Calf, Sheep, Hog, and many others; which Animals, as ſoon as they are brought to light, preſently ſeek for their food, and what is congruous for them they readily know. But in a Man, a Dog, Fox, and the like, who are more apt to learn and acquire habits, theſe Prominences are very ſmall; and theſe Animals being newly born, are furniſhed only with a rude and imperfect ſenſe; beſides, they are found wholly unapt to ſeek out their food. Upon this Obſervation (which holds good in moſt Animals which I have yet happened to diſſect) as upon a Baſis or foundation I dare build this kind of abſtruſe Hypotheſis concerning the natural Inſtincts and Affections of the *Præcordia*. For as the living Creatures which are more ſtrong in inſtinct, as Sheep, Hogs, Oxen, Goats, and other ſlow and gentler beaſts, that are not obnoxious to Paſſions, are alſo leſs docile or apt to learn; and on the contrary, they in whom the Affections are wont to predominate, and who are furniſhed with a certain wit, (as beſides Man, are Dogs, Foxes, and ſome other hotter Animals) are leſs powerful in Inſtinct: and as I have obſerved in the frequent Diſſection of all ſorts of Heads, that in thoſe kind of living Creatures, who live rather by Wit than Inſtinct, the annular Protuberance, placed below the Cerebel, was notedly great, and the orbicular Prominences only very ſmall; but in other living Creatures, where the Inſtinct exceeded the wit, and who were leſs prone to ſtrong Affections, the orbicular Prominences were very great, and on the contrary, the ringy Portuberance exceeding ſmall: From hence I was forced to think, that the orbicular or natiform Prominences, where they are great, are inſtead of another or ſupplementory Brain, and the chief Organs of the natural Inſtincts; yet ſo, as theſe parts alſo ſerve for a way or means of paſſage for the transferring the Paſſions from the Brain towards the Cerebel and *Præcordia*; and that (as we have all ready hinted) the greater exiſtency of the annular Protuberance is to contain plenty of Spirits requiſite for the winds of the Paſſions; yet in the mean time, by a further tending forwards or declination of the Spirits inhabiting this, the Species of the natural Inſtincts, being ſent from the *Præcordia* and *Viſcera* paſs through. But however the buſineſs is, becauſe nothing can be certainly affirmed, or by demonſtration, if this our Opinion pleaſe not others, at leaſt it may be pardoned.

There remains not much more to be ſpoken concerning the Offices and Uſes of the Cerebel and its Appendix. Concerning its ſubſtance, there is ſomething more worthy taking notice of, to wit, that it very much differs in this reſpect from the ſtructure of the Brain alſo, for that its cortical little circles are not founded in the ſtretched out Marrow, as the convolutions of the Brain; but being deeply cut in, are diſcontinued in their whole tract: ſo that the whole Syſtem of the Cerebel is as it were a cluſter of Grapes compacted cloſely together; in which, although the Berries be contiguous, yet they remain diſtinct one from another, and bring forth fiſſures through the whole thickneſs of the maſs. Yea the outward ſuperficies of the Cerebel conſiſts as it were of very many Tubercles or little Tad-ſtoles or Puffes which grow together on little ſtalks; and thoſe ſtalks paſs into greater branches, and they at length being bipartite or twofold, go together into two larger Marrows near the bottom of the Cerebel, in either of which are three diſtinct medullary Proceſſes: of which threefold proceſſes on either ſide we have already ſpoken. But of theſe concerning the uſe of the Cerebel in general, we ſhall yet further advertiſe you, that as very much of its ſubſtance is cortical, it begets animal Spirits in great plenty, to which in the circulating there is not granted, as in the Brain, an equally great ſpace; for that there ſeems not to be much need of it in the animal Government. For the Spirits ſo produced in the Cerebel plentifully by a perpetual emanation, ought to flow outwardly for the offices of the natural and vital Function: but more inwardly for the impulſes variouſly ſent into them, they admit certain undulations or wavings, by which ſome occaſional acts of the involuntary Function are brought forth, as is ſhewn before.

But

But as it is manifeſt enough, that the animal Spirits are generated within the cortical little circles of the Cerebel, it doth not ſeem needful that we ſhould ordain their Work-houſe in the Ventricle ſubject to its frame. For that Cavity (as we have already ſhewn) is only an empty ſpace, which lying under its double little foot and medullar Trunk, comes between it and the overlying bunching out of the Cerebel: But indeed there belongs to this beſides a certain uſe, to wit, that the ſerous watry heap laid aſide out of the Glandula's and infoldings of the Veſſels, as alſo from the ſubſtance of the Cerebel, being made over-moiſt, diſtilling down, might ſlide into this Ciſtern. From whence, leſt it ſhould flow down upon the beginnings of the Nerves, by a reſtraining Membrane it is compelled into the hole of the ſtrait Den lying under the orbicular Prominences; and from thence is received from the declining aperture of the Tunnel, and carried out.

Below the Cerebel, the oblong Marrow going forward with the reſt of its tract even to the hole of the hinder part of the Head, ends at length in the ſpinal Marrow: but in its Trunk, as yet contained within the Skull, beſides the Nerves and Proceſſes but now recited, the beginnings of the ninth and tenth pair of Nerves are alſo radicated. Of what there will be hereafter a proper place to ſpeak, when we ſhall inſtitute the whole Neurology or the Doctrine of the Nerves. In the mean time, we ſhall take notice of the beginning of the ninth pair, which is peculiar in Man, and different from what is found in Brutes: To wit, in Man below the origine of the eight pair, a certain Protuberance grows to either ſide of the oblong Marrow. Out of that four or five diſtinct Fibres do come forth; one or two of which binds about the Vertebral Artery paſſing through it, but all grow together into the ſame Trunk, which is the Nerve of the aforeſaid pair. This Protuberance, the *Pia Mater* being pulled away, may be eaſily ſeen, and ſeems to be the Repoſitory or Store-houſe of the Spirits deſtinated to this Nerve.

For as this Nerve is beſtowed on the Tongue and its Muſcles, and ſo conduces chiefly to the performing of ſpeech in Man, who hath a greater and more frequent uſe and exerciſe of the voice, there ſeems to be need of a great proviſion of Spirits, plenty of which ought always to be in a readineſs. But in Brutes, who have none, or a rarer neceſſity of the voice, ſuch a Protuberance is wanting, becauſe it is not required in them that the Spirits ſhould be gathered together by heaps, as it were in a certain Porch, before the Organs of the Voice, but that it may ſuffice for them to be called forth by degrees out of the common tract of the oblong Marrow. Further, whereas ſome fibres of this Nerve bind about either Vertebral Artery, unleſs I am deceived, that is ſo ordained for this end, leſt perhaps in ſpeaking, when at any time we are more vehemently moved, the blood being ſtirred up, might ruſh upon the Brain with a torrent. For this Nerve binding about the Vertebral Artery, as it were with a bridle, and ſo as a Moderator not only of the Tongue, but alſo of the Blood, reſtrains its more rapid influence. After the ſame manner, and for no other ends do recurrent Nerves, deſtinated to ſome part of the ſame office, variouſly bind about the Trunk of the great Artery, as ſhall be ſhewn afterwards.

As ſoon as this inferior portion of the oblong Marrow is uncloathed from the *Pia Mater*, the pyramidal bodies come in a view otherwiſe lying hid. Theſe in all Animals, endued with the annular Protuberance, are conſtantly found; alſo as that Protuberance is bigger, ſo theſe bodies appear more noted: but indeed in a Man and a Dog they ſeem like two large Nerves, which being produced out of that Ring, end over againſt where the eighth pair ariſe in ſharp points. If the uſe of theſe be ſought into, it is moſt likely, that the animal Spirits ſuperabounding in the annular proviſion or ſtore, do flow out as it were by theſe Emiſſaries, which Spirits however run into the beginnings of the eighth pair placed near, and ſo are beſtowed by their proper means on the offices of the involuntary Function.

Although the oblong Marrow retains not its name beyond the limits of the Skull; yet it is the ſame ſubſtance, which from thence being continued further into the cavity and utmoſt receſſes of the whole Spine or Back-bone, is called the Spinal Marrow: but it is brought forth for this, that the Nerves to be diſtributed into the Limbs and Members more remote from the Head, might more commodiouſly ariſe out of the ſame medullar ſubſtance ſtretched out into the neighbourhood of every part. Indeed all this whole medullar Trunk, which is continued from the bottom of the Brain even to the *Os ſacrum*, ſeems like the Pneumatick Cheſt, or Bellows of a pair of Organs, which includes the blaſt or breath deſtinated to every Pipe; for in like manner the animal Spirits are contained in this marrowy tract, which blow up and actuate all the Nerves hanging thereto, as occaſion ſerves.

If you behold the origine of the whole, it ſeems that the whole frame both of this oblong Marrow and the ſpinal, is of a medullar or marrowy ſubſtance, every where growing diſperſedly through the Brain and Cerebel, and then being gathered more round together in the middle of either, becomes as an heap. For the Marrows beſmearing all their folds and turnings about, are as ſo many little rivers, which ſpringing from thence, begin to be congregated in the middle, and to be poured out in one great one; but being from thence united, they make the oblong Marrow, as it were the chanel of the Sea, big enough for the motion or ebbing and flowing and reciprocation of the animal Spirits: which belly or chanel, however ſtretching it ſelf further beyond the Skull, is increaſed into the ſpinal Marrow, as it were the boſom or proceſs of the former.

But as the medullar tracts, beſmearing the folds and convolutions of the Brain and Cerebel, unfold themſelves into their middle Marrows and medullar Trunk, and ſo the Spirits ſpringing diſperſedly from their firſt fountains, congregate as it were into a certain diffuſed Sea; ſo from this Sea, cauſing an ebbing and flowing, or a continual or very frequent influence of the animal Spirit, the ſame Spirits flow out into the depending chanels of the nervous Syſtem.

Concerning

Concerning this part of this Marrow, which being included in the long boſom or chanel of the *Vertebræ* or Back-bone, and according to all their joyntings, being marked with as it were knotty proceſſes, is called the Spinal, there occur not many things worthy conſideration, beſides what are commonly known. The figure, ſituation, as alſo the body of this, in its whole tract, are known generally to be cloven in two, not only by Anatomiſts, but by every Butcher. The ramifications or branchings of the Nerves, proceeding from the ſpinal Marrow, are delivered hereafter. Concerning its conformation ſomething peculiar occurs. For as the ſpinal Marrow is as it were the common paſſage or chanel of the Spirits flowing out of the Head into the Nerves, it may be obſerved, that this chanel, not after the uſual manner of other paſſages, where many rivers flow in, doth ſwell up more; but on the contrary, in what place it hath more and greater Emiſſaries, its magnitude is increaſed; for in thoſe parts of the ſpinal Marrow, out of which the brachial and crural Nerves ariſe, (or thoſe Nerves belonging to the Arms and Legs, whoſe beginnings are more and larger) its Trunk becomes much thicker than in the reſt of the frame or ſubſtance. The reaſon of this is, becauſe within the medullar tracts the animal Spirits run not, nor paſs through with ſo ſwift a paſſage, but for the moſt part flowing leiſurely from their Fountains, when they have filled the whole ſpace, they ſtay therein; and as many Spirits, upon occaſion offered, are wont to be beſtowed on every work, thoſe remaining there in readineſs frame certain convenient Promptuaries where they may divert themſelves. Wherefore we ordinarily obſerved, not only of this Marrow, but of the Nerves themſelves, that as often as a ſmall branch is diſtributed into many ſhoots or ſuckers to be ſent forth here and there, always in the very knot of the diviſion there grows a far greater fold than in the reſt of the Trunk of the Nerve; ſo that 'tis a wonder from whence the Nerve ſhould acquire ſo in the middle of its paſſage a new ſubſtance and more ample bulk. But of theſe things and others belonging to the Doctrine of the Nerves, it behoves us to diſcourſe in the following Chapters.

CHAP. XIX.

Of the Nervous Syſtem in general, where its parts (which are the Nerves and Fibres) being deſigned, a proſpect of the whole Animal Goverment is exhibited.

WHen as hitherto having beheld the ſeveral Regions of the Brain it ſelf, the Cerebel, and medullar Appendix, and the proviſion and offices of them all, we have deſigned or drawn forth the uſes and employments alſo of the parts and proceſſes, and the ſanguiferous Veſſels belonging to every one of theſe; it is now time for me to ſtop and retire into the Port from this troubleſom and intricate Sea of Diſquiſition: But indeed, becauſe I find that I have not yet reached to the fartheſt ſhores and utmoſt parts, but that beyond this Sea, which we have ſailed through, as yet the nervous Syſtem, and very many Creeks or Boſoms, Meanders, and highly intricate Receſſes or private places in it remain to be viewed; therefore although we know it is difficult to proceed with full Sail, we have reſolved to undertake the task of the Doctrine of the Nerves; and the rather, becauſe without the perfect knowledge of the Nerves, the Doctrine of the Brain and its Appendix would be left wholly lame and imperfect; for neither what hath already been delivered concerning them can be ſufficiently undeſtood or illuſtrated, nor (which I chiefly deſire, and is the end of the former Diſquiſitions) without thoſe things before known can the Pathology of the Brain and nervous ſtock be rightly inſtituted. And indeed there are many things which might eaſily deter any one from ſuch an undertaking: to wit, the hardneſs of the work, and full of hazard; which promiſes at firſt-ſight more difficulty and thorny labour, than pleaſure or profit. Then ſome will object, that this Province is already ſo perfectly cultivated, and adorned by former Anatomiſts, that by a repetiton of the ſame, I may ſeem to have medled with a thing done to my hand. But I may readily anſwer to theſe, firſt, That the Anatomy of the Nerves yields more pleaſant and profitable Speculations, than the Theory of any parts beſides in the animated Body: for from hence the true and genuine Reaſons are drawn of very many Actions and Paſſions that are wont to happen in our Body, which otherwiſe ſeem moſt difficult and unexplicable; and no leſs from this Fountain the hidden Cauſes of Diſeaſes and their Symptoms, which commonly are aſcribed to the Incantations of Witches, may be found out and clearly laid open. But as to our Obſervations about the Nerves, from our following Diſcourſe it will plainly appear, that I have nor trod the paths or footſteps of others, nor repeateed what hath been before told.

Therefore

Therefore, that according to our determination we may enter upon the explanation of the nervous Syſtem, we ſhall comprehend under this name all parts, upon which gifted with the animal Spirit, Motion and Senſe neceſſarily and immediately depend, to wit, for the performing either one only, or both together in the whole Body. But theſe kind of parts, in reſpect of the Head and marrowy Appendix, are like a branching ſtock or imps growing out of the trunk of a Tree: for ſuppoſing that the cortical ſubſtances of the Brain and Cerebel are in the place of roots, and that the ſubſtances every where medullar are taken for the ſtock or pith; the nervous germination or budding forth expanded into divarications of Nerves and Fibres, will appear like ſo many little branches, twigs, and leaves. Or if the Head containing in it ſelf the chief part and power of the ſenſitive Soul, be taken for the body of ſome Luminary, as of the Sun or a Star; the nervous Syſtem ſhall be that radiant or beamy concretion compaſſing it about. Becauſe the animal Spirits flowing from the Brain and Cerebel, with the medullar Appendix of either, as it were from a double Luminary, irradiate the nervous Syſtem, and ſo conſtitute its ſeveral parts, the Organs of Motion or Senſe, or of both together, as hath been ſaid.

The parts of the nervous Syſtem, as a radiant or beamy texture, are either primary, *viz.* the bodies themſelves of the Nerves, into which the animal Spirits immediately flow from the Head and its medullar Appendix; or ſecondarily, which are Fibres planted or interwoven in the Membranes, muſculous Fleſh, Tendons, and ſome of the Parenchyma, which alſo contain in themſelves animal Spirits; but they receive them not but mediately and ſecondarily derived from the Head through the bodies of the Nerves.

We have already ſhewed that the animal Spirits are procreated only in the Brain and Cerebel, from which they continually ſpringing forth, inſpire and fill full the medullar Trunk: (like the Cheſt of a muſical Organ, which receives the wind to be blown into all the Pipes) but thoſe Spirits being carried from thence into the Nerves, as into ſo many Pipes hanging to the ſame, blow them up and actuate them with a full influence; then what flow over or abound from the Nerves, enter the Fibres diſperſed every where in the Membranes, Muſcles, and other parts, and ſo impart to thoſe bodies, in which the nervous Fibres are interwoven, a motive and ſenſitive or feeling force. And theſe Spirits of every part are called Implanted, foraſmuch as they flow not within the Nerves, as the former, with a perpetual flood; but being ſomething more ſtable and conſtant, ſtay longer in the ſubject bodies; and only as occaſion ſerves, *viz.* according to the impreſſions inwardly received from the Nerves, or impreſſed outwardly by the objects, are ordained into divers ſtretchings or carryings out for the effecting of motion or ſenſe either of this or that manner or kind.

Indeed the animal Spirits flowing within the Nerves with a living Spring, like Rivers from a perpetual Fountain, do not ſtagnate or ſtand ſtill, but ſliding forth with a continual courſe, are ever ſupplied and kept full with a new influence from the Fountain. In the mean time, the Spirits in the reſt of the nervous kind, eſpecially thoſe abounding in the Membranes and muſculous ſtock, are like Ponds and Lakes of Waters lately diffuſed from the chanels of Rivers, whoſe waters ſtanding ſtill are not much moved of their own accord; but being agitated by things caſt into them, or by the blaſts of winds, conceive divers ſorts of fluctuations.

But becauſe there is no light difference between the motions and conſiſtency of the Spirits and of Waters, perhaps it will better illuſtrate the matter, if the Spirits of either kind, to wit, the inflowing and implanted, are compared to the beaming forth of divers rays of light. And ſo when light is let into a dark chamber, and preſently inlightens the whole, we may conceive the particles of the light ſo ſwiftly diffuſed to be of a twofold kind; to wit, ſome are bodies ſent from the light it ſelf, which diffuſe themſelves every way into an Orb; and other luminous particles are as it were Etherial little bodies exiſting before in the pores of the Air, which being agitated by the former, and as it were inkindled, cauſe as it were a flamy, though moſt thin contexture, ſtretched out in the whole clearneſs. After the like manner, the animal Spirits flowing from the medullar ſubſtance into the Nerves, are as it were rays diffuſed from the light it ſelf, and the other Spirits every where abounding in the Fibres, are as ſo many lucid particles included and implanted in the Air, which are actuated by the former, and being ſtirred up by them into motion, perform the acts both of the ſenſitive and locomotive Faculty.

That it may better appear by what means the animal Spirits do irradiate and ſwiftly paſs through the parts of the nervous Syſtem, both primary and ſecondary; ſo that light is ſcarcely carried ſwifter through a diaphanous Medium, than the communication of the Spirits is made from one end of the nervous Syſtem to the other; it will be requiſite to inquire here a little concerning the Origine of the Nerves and nervous Fibres, alſo of their Fabrick and Conformation, to wit, what pores and paſſages either of theſe bodies have, and how diſpoſed for the paſſing through and commerce of the animal Spirits.

As to the Nerves, it is manifeſt from what hath been ſaid, that all of them are produced immediately out of the medullar Trunk or its proceſſes; ſo that as theſe parts are the common and broad roads which lead both from the Brain and from the Cerebel, all the Nerves are particular paths reaching out from them on every ſide into the ſeveral Regions of the animated Body. Wherefore the ſame Marrow, which is the original of every Nerve or Sinew, foraſmuch as it is drawn into a more thin thread, conſtitutes the matter of the ſame Nerve; which indeed, that it may be made more ſolid and compact, is cloathed with a peculiar production of the *Pia Mater*, for as from a Silver maſs gilt or inriched with

Gold, all the threads produced from it are gilded; ſo the ſame Membrane, which covers the medullar Trunk, is produced together with all the Nerves coming out from the ſame, and cloathes them all. Further, very many Nerves ariſing together out of that marrowy beginning, go forth as it were by bands; which notwithſtanding, for the ſake of the better paſſage, being preſently united and carried out of their bony Cloiſter, are included in a common Coat taken from the *Dura Mater*. For we ſuppoſe (which alſo ſhall be more clearly ſhewed anon) that all the Nerves, deſtinated to any parts or every particular member, do ariſe diſtinctly and apart, and ſo remain in their whole paſſage. But in that oftentimes a Nerve appearing as it were one Trunk, afterwards ſeems to go into many branches, it is becauſe thoſe branches being indeed ſingular, and divided in the whole paſſage, are collected as it were into one bundle; for ſometimes we have ſeparated thoſe Nerves, ſeeming to grow together as it were into one rope or cord of of a Nerve, one from another, dividing them to their very original; for neither otherwiſe could the Inſtincts of the Motions to be performed be carried ſo reſpectively to theſe or thoſe parts, ſeparate one from another, to which the branches of the ſame Trunk belong.

The paſſages of the Nerves are not bored through as the Veins and Arteries; for the ſubſtance of thoſe are not only impervious to any Bodkin, but no cavity can be ſeen in them, no not by the help of Spectacles or a Microſcope. As to what belongs to the ſmelling little Pipes, they ſeem to be ſo made, not for the paſſage of the animal Spirits, but that ſome ſeroſities might ſlide down that way: but the Spirits themſelves are carried in the ſides, and not in the cavity of either Pipe; but the ſubſtance of the other Nerves appears plainly firm and compacted, that the ſubtil humor, which is the Vehicle of the Spirits, may paſs through their frames or ſubſtances, even as the ſpirits of Wine, the extended ſtrings of a Lute, only by creeping leiſurely through. Hence it may be argued, that becauſe the animal Spirits require no manifeſt cavity within the Nerves for their expanſion; neither is there need of the like for them within the ſubſtance of the Brain; but that the Ventricles, commonly ſo called, ought to be deputed to ſome other office than this.

But the Nerves are white, ſmooth, and round bodies: within the Skull and nigh their beginnings, being as it were only covered with the *Pia Mater*, they are ſoft and eaſily broken; without this, for that many of them are for the moſt part gathered together, and alſo cloathed with the *Dura Mater*, they become ſomewhat hard and more tenacious. The Nerves themſelves (as may be diſcovered by the help of a Microcoſm or Perſpective-glaſs) are furniſhed throughout with the pores and paſſages, as it were ſo many little holes in a Honey-comb, thickly ſet, made hollow, and contiguous one by another; ſo the Tube-like ſubſtance of them, like an *Indian* Cane, is every where porous and pervious. Within theſe little ſpaces the animal Spirits or very ſubtil little Bodies, and of their own nature ever in a readineſs for motion, do gently flow; to which is joyned, both for a Vehicle, as alſo for a Bridle or ſtay, a watry Latex, and that it ſelf of very ſubtil parts. This Humor diffuſes, with its fluidity the Spirits through the whole nervous Syſtem; alſo by its viſcoſity retains them, that they be not wholly diſſipated, but as it were in a certain *Syſtaſis* and continued Series; for it ſeems, that without ſuch an Humor the Spirits could not conſiſt within the nervous ſtock, but they would vaniſh away into Air. Further, the ſame Humor is no leſs required for the paſſing through of the ſenſible Species: becauſe the animal Spirits, we ſuppoſe, like the rays of Light, to be diffuſed through the whole nervous Syſtem; and thoſe rays, unleſs the humid particles of the Air be mingled with them, do not eaſily tranſmit the forms or images of things; as is obvious in an Optick Scene, which is hid or ſhadowed by the clear beams or brightneſs of the Sun. And in like manner, from the defect or depravation of the nervous Juyce, we can readily ſhew, that the inordinations of the animal Spirits, and oftentimes moſt horrid diſtempers of the Brain and the nervous ſtock do ariſe.

This nervous Juyce being derived from the Brain and Cerebel into the medullar Appendix, is carried from thence by a gentle ſliding down through the Nerves even into the whole nervous ſtock, and waters its whole Syſtem. Upon the equal emanation of this depends the expanſion of the animl Spirits through the whole; and the ſubſtance of theſe, yea the Hypoſtaſis of the ſenſitive Soul it ſelf is founded on the diffuſion of the ſame humor. The animal Spirits being left to themſelves, follow the motion of this Juyce, and flowing together with it in the ſame courſe, are pleaſingly or quietly expatiated; but in the mean time, as occaſion is offered, the ſame Spirits, as a breath moving upon thoſe waters, conceive other ſpreadings abroad, and thoſe more rapid. For as in a River, from winds or any thing caſt in, divers undulations or wavings are ſtirred up; ſo the animal Spirits being raiſed up by objects for the performing the offices of ſenſe and motion, do tend this way or that way to and fro within the nervous ſtock, and are agitated hither and thither by other means.

But to return to the parts of the nervous Syſtem, beſides the Nerves themſelves, Fibres alſo being diſperſedly interwoven in the Membranes, the muſculous Fleſh, the Parenchyma, and other parts, and united in the Tendons, are the Organs of ſenſe and motion. Yea, the acts of their faculties are principally and more immediately executed by the Fibres than the Nerves; for they, by drawing together the Muſcle and other motive parts, cauſe the motion it ſelf; but the Nerves only carry from the Head the inſtinct for the performing of that motion. In like manner, in Senſation the Fibres receive firſt of all and immediately the impreſſions of ſenſible things, and expreſs the ſame (as muſical ſtrings do the ſtrikings of a quill or fingers) by an intrinſecal modification of the Particles, and repreſent the various approaches of the object by the like motion of the Fibrils, as by a moveable and fluid Character, whoſe Idea the Nerves transfer only to the Head.

Concerning

Concerning the nervous Fibres it behoves us to inquire from whence they have their riſe? For it appears plainly, that they ariſe not immediately from the Head or its medullar Appendix; not is it leſs improbable, that they are produced (as 'tis commonly ſaid) from the Nerves: becauſe what is aſſerted, that the Fibres are productions of the Nerves, and little bits or pieces of them torn off, as it were into hairy branches, ſeems unlikely; for that the Fibres in ſome parts, being placed nigh, exceed in their bulk the magnitude of the Nerve that is brought to that part, at leaſt an hundred-fold: which thing appears clearly from the Tendon of every Muſcle, which being made up of united Fibres, is obſerved to be far greater than the Nerve inſerted to it. And indeed for almoſt the like reaſon we are induced to think the nervous Humor it ſelf alſo, whereby the Membranes and muſculous Fibres are wont to be watered, to be derived unto them not by the only means and paſſage of the Nerves; becauſe it is heaped up much more plentifully and in more abundance than can be carried thither through thoſe narrow paſſages, as appears clearly in Ulcers of the Kings-Evil, or in Impoſtumes or Wounds of the Tendons and nervous parts, in which a glutinous Humor drops forth in ſo great abundance, that all the Nerves of the whole Body could ſcarce be able to ſupply it.

Wherefore concerning theſe, it ſeems that we may affirm, that the Fibres are not continued portions of the Nerves broken off into little hairy ſtrings or Capillaments; and that all the Fibres originally proceed not from the Nerves, becauſe ſome of them, *viz.* thoſe interwoven to the Heart and its Veſſels are of equal birth with the Nerves themſelves, and coexiſt with them together from the beginning. However the moſt Fibres, as to their production, depend upon the Nerves; and all, which way ſoever brought forth, receive conſtantly from the Nerves the forces and ſupplements of the animal Spirits, and alſo Inſtincts of the Motions to be performed by them.

Therefore to recount the births or kinds of Fibres; they are firſt either ſpermatick and firſt begotten, the rudiments or firſt beginnings of which being of the like antiquity as the Heart and Brain, placed in the Conception, afterwards leiſurely increaſe; to wit, ſuch are, as hath been ſaid, thoſe in the Heart it ſelf in its depending Veſſels, the Membranes and ſome other parts, which form the firſt ſtuff or threads of the Embryo: or ſecondly, other Fibres are produced ſecondarily, and by a ſecond birth; of which ſort chiefly are ſuch which are interwoven into the parts taken for the compleating of the animal Fabrick, and eſpecially thoſe termed Sanguineous, which we think to be begotten after this manner.

The Heart and Brain, with the Arteries and Nerves hanging to them, are primigenious parts, and highly original; but theſe, for the ſecond birth of others, and for the nutrition and increaſe of all the ſenſitive parts, diſtribute a twofold humor: *viz.* one ſpirituous and endued with very active Particles which perpetually flow, though but in a very ſmall quantity, through the paſſages of the Nerves from the Brain and Cerebel; and the other flow and ſofter, which being every where laid aſide through the Arteries from the bloody maſs, is rendred more plentifully. This latter being of it ſelf dull and thicker by much, is actuated by the former, and being imbued by it, as by a certain Ferment, acquires ſtrength and power of growth or vegetation. But indeed the nervous Juyce, foraſmuch as it diffuſes with it ſelf the animal Spirits, imparts to every part, beſides the faculties of Motion and Senſe, the determinations alſo of form and figure. Further, whilſt that, being joyned to the other arterious humor, is diſpoſed into the ſubſtance and matter of the member or part to be nouriſhed, it forms ſome tracts as it were, to wit, the Fibres themſelves, in which the animal Spirits, coming together with them, reſide and are expatiated. Theſe twofold or twin humors, coupling together in every ſenſitive part, conſtitute a liquor truly nutritious, to wit, which is both ſpirituous and nouriſhable. And in truth, both theſe Juyces, *viz.* the nervous and arterious, being married together, are as it were the male and female ſeed, which being mingled in a fruitful womb, produces the plaſtick Humor, by thoſe virtue the living creature is formed and increaſes. Hence may be obſerved, as the particles of the ſpirituous liquor, or of the other more watry juyce (*viz.* this latter being ſupplied from the Arteries, or that from the Nerves) are ſtrong or excel, as to their properties or powers, all living creatures become more or leſs nimble, active, and ready to any motion and labour. Beſides, from the default or depravation of the one and other humor excelling, the ſorts or kinds of this or that diſeaſe are excited; concerning which, and alſo what belongs to the explication of the nutritious Humor, we may perhaps have ſome other time occaſion to diſcourſe.

The animal Spirits which enter and fill the ordained ſeries of the Fibres as ſo many little places, flow thither by the paſſages of the Nerves; notwithſtanding the Spirits which are ſeated in the Fibres, interwoven with the muſculous ſtock, receive nouriſhment, yea and as it were auxiliary forces, from the arterious blood there plentifully flowing: whereby indeed both the Spirits themſelves acquire for the performing of Motions a greater force and as it were elaſtick; ſo that their force being ſtirred up by a ſtrong endeavour, it ſeems like the exploſion of Gun-powder; and alſo the ſame Spirits being continually conſumed within the Muſcles more profuſely than is wont to be in the Membranes and other parts, are in ſome meaſure made up or repaired from the bloody ſuſtenance: becauſe whenas the arterious Juyce joyns more plentifully with the nervous flowing within the ſanguineous parts, it may be well thought, that it alſo lays upon the Spirits brought thither with it, as it were ſome nitroſulphureous particles, and intimately fixes them on them; and ſo, by reaſon of this Copula, highly flatuous and apt to be rarified, the Spirits themſelves become there more active, ſo that in every motive endeavour, whereby the Muſcle is ſuddenly intumified, they, as if inkindled, are exploded. Moreover, a ſudden refection of the conſumed or waſted Spirits, after great exerciſe or labour, is for this reaſon alſo performed by the blood; for that the ſpirituous particles

particles being left and forſaken by motion, preſently a new Copula of the ſame kind of matter, apt for exploſion, is joyned to them. For it is not poſſible, that the immenſe loſs of Spirits which happens in hard labours (if they were wholly deſtroyed) in ſo ſhort of time, ſhould be able to be reſtored by ſupplements coming only through the Nerves. We ſhall diſcourſe more largely of theſe things, if at any time hereafter we ſhall treat of the Motions of the Muſcles.

The animal Spirits being diſpoſed within the ſeveral Muſcles, according to the ſeries of Fibres, ſeem as it were ſo many diſtinct Troops or Companies of Souldiers; all which being ſet as it were in a Watch-tower, are ordained, as a new impreſſion is carried to them by the Nerves, either from the objects outwardly, or more inwardly from the Head, forthwith into various forms and peculiar orders for the performing of motion or ſenſe of this or that kind. The carriage or behaviour of theſe is worth the ſeeing in an animal newly killed and its skin taken off. For when life periſhes, and all the force of the Spirits flowing in through the Nerves hath quite ceaſed: yet the Spirits implanted into the whole Body breaking forth from the Muſcles, ſtill move and ſhake them, and force them into ſeveral Convulſions and trembling motions.

From what hath been ſaid we may gather, what the diſpoſition or order of the animal Spirits may be in the whole animal Body: to wit, thoſe procreated in the cortical ſubſtance both of the Brain and Cerebel, are congregated into the middles of either, as it were into diſtinct Empories or Marts; and an expanſion being made in either, they cauſe certain interior powers of the Senſitive Soul to be exerciſed; yet the ſame Spirits, affecting more room, enter the oblong Marrow (as it were the Cheſt, as hath been ſaid, of a muſical Organ) and fill it full; within which flowing, they carry to and fro the impreſſions of ſenſible Things and the Inſtincts of Motions. From the oblong and ſpinal Marrow the ſame Spirits, unleſs when they are otherwiſe buſied, tending outwardly, flow towards the ſeveral parts of the whole Body; which notwithſtanding wandring ſo out of doors, becauſe they paſs through very ſtrait ways in their paſſage, to wit, the ſlender bodies of the Nerves, they break not forth in heaps, or in a thick troop, but only contracted orderly, and as is were by bands or diviſions: but they being carried beyond the extremities of the Nerves, and there poſſeſſing the Membranes, Muſcles, and other ſenſible parts, dilate themſelves as it were into a moſt ample field, and with a very diffuſe Army they dwell in the Pores and paſſages of the Fibres planted every where about; where alſo being endowed from the blood with new food, they become more lively and more expeditious or ready for the deſigned offices.

Here perhaps it may be demanded, how the animal Spirits, diffuſed in ſuch numerous troops through the habit of the Body, are able to be ſupplied by ſo ſtrait chanels of the Nerves? To which we reply, That thoſe which reſide more outwardly do not quickly evaporate, nor are remanded back by Circulation: wherefore when all the Fibres are filled by an influx of the Spirits made by little from the beginning, very ſmall ſupplements ſuffice to repair their expence: For neither are thoſe dwelling more outwardly, for that they are repaired by the bloody food, much conſumed, though in frequent action.

Hence may be noted the difference between the diſtributions of the blood and animal Spirits. That Latex, becauſe it is reduced in a circle, its Veſſels are in the whole paſſage proportionated as to the bulk of the Trunk and the branchings ſent from it, to wit, ſo that the branches of the great Artery, being carried from the Heart, contain at the leaſt ſo much of the blood, as the ſhoots reaching forth from them, into all the parts. But becauſe the animal Spirits being once begotten and carried more outwardly, ſubſiſt longer there, and evaporate very ſlowly and by little and little; therefore the Veſſels carrying them, *viz.* the Nerves, in reſpect of the Fibres receiving rhem, are made much leſſer in proportion; leſt perhaps by too great a ſupplement of the animal Spirits, and the too thick gathering of the freſh ones ſtill into the nervous parts, the Army of the Veterans, before inſtructed, ſhould be confounded, and ſo the orders of all being diſturbed, the exerciſes of the animal Function ſhould be performed any now. For indeed when at any time the Spirits are made too ſharp, ſo that being therefore ſtruck as it were with madneſs, they ruſh upon the nervous Syſtem with tumult and impetuoſity; from hence a great unquietneſs and continual throwing about of the Members are wont to be excited, to which ſometimes madneſs and fury ſucceed.

In the order and ordination of the animal Spirits, ſuch as was but now deſcribed, the *Hypoſtaſis* or the Eſſence of the ſenſitive Souls conſiſts to wit, which is only a certain *Syſtaſis* or ſhadowy ſubſiſtence of thoſe Spirits, which like Atoms or ſubtil Particles, being chained and abhering mutually one to another, are figured together in a certain Species. Moreover, the faculties of the ſame Soul depend upon the various *Metatheſis* and geſticulation of thoſe Spirits within the aforeſaid Organs of the Head and nervous Syſtem. But the conſideration of this Soul and its powers requires a peculiar Tract, which hereafter (God willing) we intend; in the mean time, our Method demands of us, that (accorging to our weak skill) by the cenſe or numbering of the Nerves, being particularly made, we ſhould deliver an exact Neurology or Doctrine of the Nerves.

But for that in the premiſed general conſideration of the Nerves and Fibres, there was mention made of the nervous and nutritious Juyce; notwithſtanding what belongs to their powers and natures, hath been neither fully nor clearly enough delivered; therefore we will a little divert here, and make it our buſineſs to inquire what ſort of Juyces and Humors are carried into the parts of the animated body for their nouriſhment, and by what ways or paſſages: then this difficulty being removed, a plain and eaſie way leads into the Doctrine of the Nerves.

CHAP.

CHAP. XX.

Of the Nervous Liquor, and whether that or the bloody Humor be Nutritious.

SInce the Circulation of the Blood was made known, and it hath been plainly made appear, that it did no where ſtagnate and ſtand ſtill long, but was carried in a reciprocal motion, always as in a circle; it began to grow doubtful, whether its *Latex* is nutritious or not. For beſides, that the more rapid courſe of the blood, as of a torrent, might ſeem to wear the banks which it flowed between, and to carry away ſome Particles from them, rather than to be able to affix any thing to them; the ſubſtance it ſelf alſo of the blood, for that it is more torrid and uneven, is thought to be altogether unfit for nutrition. Wherefore that a Juyce may be found more convenient or fit for this office, the paſſages and hidden receſſes of the Nerves are to be viewed; and as a certain Latex is found to flow within their Pores and paſſages, preſently the blood being rejected, that nervous humor is gifted with the title of nutritious: but yet by what right, and after what manner nutrition is performed, ſhall be our preſent purpoſe to inquire.

And here firſt of all, that we may take the part of the blood, it will be eaſie to ſhew, that there is matter contained in it fit enough for the nouriſhment of the body, aud a ſufficient ſtore of it. For beſides the ſulphureous ſubſtance of the blood, which within the fire place of the Heart, with a continual inkindling, and by that means deflagration in the Veſſels produces life, and in the more perfect Animals heat, there is found alſo a certain other humor ſoft and alible, which in the Circulation, being diſtributed through ſeveral parts of the Body, by increaſing them adds nouriſhment and bulk: yea the deflagration it ſelf of the blood, plainly as a Kitchin-fire in dreſſing meat, as it were boils and prepares this humor, whereby it more eaſily is aſſimilated into the ſubſtance of every part to be nouriſhed. Hence it comes to paſs, that by reaſon of a defect of heat in the blood, no leſs than of exceſs, nutrition is often hindered. But that this kind of alible Juyce is contained in the blood maſs, the *Anatomy* or ſpontaneous *Analyſis* of its *Latex* ſufficiently declares; for the extravaſated blood, when it goes into parts of its own accord, this liquor being disjoyned from the purple thick part, and ſwimming a top of it, appears clear or limpid; but by reaſon of its more thick contents, to wit, the nutritious Particles, like the white of an Egg, it is eaſily made thick, and grows white by a gentle heat: which thing appears by this familiar Experiment, to wit, if you ſhall evaporate a little of it only in a Skillet over the fire, the whole liquor will preſently grow together into a white Gelly. By this liquor, as the blood is more or leſs imbued with it, living Creatures grow and become more fleſhy or lean: for both the blood of younger Animals being looſned from cold, is wont to ſhew much more of this kind of white than more ancient or older Creatures: and we may take notice daily at our Tables, that very much of this kind of Gelly comes out of the fleſh of a Lamb or Calf being boiled or roaſted, and nothing almoſt from Mutton or Beef, eſpecially if old. Therefore we may lawfully ſuppoſe, that the blood is truly nouriſhable; and that the whole, or at leaſt the greateſt part of the matter, for the adding bulk or ſubſtance to every part, is diſpenſed from it: but if at any time it be defective in this its office, that happens not out of the natural unfitneſs of it, but becauſe its diſpoſition is ſometimes depraved, and as the Stomach labouring with ſome vice, rejects or perverts the Chyle to be cooked by it.

But the blood, as it is not the only and alone humor, which is diſtributed in the animated Body, ſo neither ſeems it able to perform alone and of it ſelf the whole office of nutrition. For beſides that, being diffuſed through the Arteries and Veins, another Latex is every where diſpenſed from the Head through the Nerves; which ſhall be ſhewn to afford ſomething at leaſt to nouriſhment.

As to the firſt, there are many reaſons which declare that kind of humor to be in the Brain and nervous ſtock, and to abound in their whole paſſages. For unleſs the animal Spirits, continually flowing out, ſhould be founded in ſuch a Latex, which is their Vehicle, they would not be contiguous or joyned, nor able to continue and knit together the *Syſtaſis* of the ſenſitive Soul. For if *Hipocrates* did obſerve long ſince, that Cramps and Convulſive motions were produced from drineſs and emptines, that perhaps might happen by this means: to wit, becauſe humor in the Nerves or Fibres being deficient, the Spirits diſtracted one from another, were ſeparated; which notwithſtanding, that they might ſtill retain their mutual embraces, and as it were folding of hands, bend the containing bodies, and very much contract, and ſo force them into Convulſions. Beſides, Wounds and Impoſtumes of the Tendous and nervous part ſeem to witneſs the diffuſion of the nervous Juyce, either of which drop forth a thin Ichor, and wholly unlike to the mere bloody Excretion: no leſs may be argued from the Ganglia and evil running Sores. In time of ſleeping the aforeſaid humor is wont to flow more plentifully into the Brain and Nerves, and to obſtruct their paſſages; and therefore yawnings and ſtretchings come frequently upon thoſe awaking, that its reliques might be ſhook off. Laſtly, we might readily ſhew, that from the depravation of the

the nervous humor, Melancholy, Madneſs, and ſome wonderful Convulſive diſtempers proceed. But it may be objected, that there is no ſuch kind of humor, becauſe the Nerves being cut aſunder, it is not perceived to flow out; and that the Nerves being alſo bound, they do not ſwell above the Ligature, as Arteries and Veins. But it may be anſwered, That the liquor flowing in the nervous ſtock, is very ſubtil and ſpirituous, and which, by any ſtriving or wrinkling up of thoſe parts, when they are roughly handled, may eaſily evaporate and be blown away or diſperſed unperceivably. Then further, tis obſerved in the Whelps of ſome Animals newly litter'd, who have as yet that juyce viſcous, and not eaſily to be diſperſed, and that have their Nerves greater, if they be bound hard together with cords they will ſwell above the Ligature.

Therefore ſeeing it appears, that a certain Humor doth creep through the blind Pipes and paſſages of the Head and of the Appendix, both medullar and nervous, it behoves us next of all to inquire from whence that comes thither, and whither it tends; and laſtly, of what kind of nature and uſe it is. Concerning theſe firſt it appears, from what hath been ſaid, that the aforeſaid Latex, ſerving for a Vehicle of the animal Spirits, is perpetually inſtilled, together with them, from the blood watering the exterior confines of the Brain and Cerebel, which from thence, paſſing through the medullar Trunk, is afterwards, with a gentle ſpring, poured through the whole frame of the nervous Syſtem; ſo that the firſt fountains of the nervous humor are in the Brain and Cerebel. But further, to this Juyce conveying the forces of the animal Spirits, and ſupplied only from the Head, there joyns a certain other humor, as it were auxiliar in the whole paſſage, and reſtores and refreſhes it otherwiſe about to grow deficient.

We think that theſe kind of ſupplements and ſubſidies, which happen to come from elſewhere to the nervous Juyce flowing from the Head, are received and addmitted inwardly from the ſides and extremities of the medullar and nervous Syſtem. We have already ſhewed that an humor, as it were ſecondary, is inſtilled from the blood watering theſe parts in its whole paſſage; becauſe the Arteries follow out only the medullar Trunk, but alſo the greater Trunks of the Nerves in many places, and inſert into them ſanguiferous ſhoots. Beſides, foraſmuch as the animal Spirits flowing within the nervous ſtock for the performing of ſenſe and motion, tend to and fro, and ſo bear a double aſpect; it is probable alſo, that the liquor watering the Nerves, as it moſt commonly tends forward, ſo ſometimes backward; and ſo that the extremities of the Nerves, implanted in ſome parts, imbibe from them the humor, at leaſt ſome Effluvia's, with which they are ſatisfied, and oftentimes transfer them into the Brain it ſelf. Certainly there is no doubt, that the Fibres and nervous Filaments or threads which cover the Senſory of taſte, and the *Viſcera* ſerving for Concoction, do immediately receive ſome taſtes of the taken in food, from which ſupplies are carried to the Brain it ſelf in great hunger and faintneſs of Spirits. Becauſe if at any time the Spirits inhabiting it, being exhauſted very much with heavy and long labour, begin to fail, a moſt ſwift refection is performed, Pectorals or Cordials being ſcarcely ſwallowed, and long indeed before the alible Juyce can be able to reach to the border of the Brain by the paſſage of the blood. Moreover it is moſt likely, that not only the benign Effluvia's of the aliment are received by the extremities of the Nerves ending about the *Viſcera*; but alſo by this way, that oftentimes an infeſtous matter, and in a manner malignant, is communicated by the Nerves and their paſſages to the Head. But indeed the preternatural Juyces heaped up about the Hypochondria, the Spleen, Womb, and other Bowels emit vaporous little bodies, which not only infect the bloody maſs, and diſtemper the Head by that means, but they climb to the Brain more immediately by the paſſage of the Nerves, and ſtrike it with an heavy ill. For from hence in part it comes, that Hypochondriacks and Hyſterical people are ſo cruelly puniſhed through the Symptoms ſtirred up in the Brain and nervous ſtock for the faults of the lower Bowels; hence it is, that little Pills of Opium, being ſcarcely diſſolved in the Stomach, cauſe a Torpor or heavineſs. But here is no place to diſcourſe more largely of theſe. It behoves us to conſider what remains, the Springs of the nervous Juyce, the Auxiliaries but now detected, and its Virtues and influences.

Concerning the nervous Liquor we ſhall inquire what that doth in its paſſage, to wit, whilſt it flows within the Marrows or middle of the Brain and Cerebel, the medullar Trunk and the bodies themſelves of the Nerves: ſecondly, then for what uſes it ſerves, when being ſliden from the ends of the Nerves, it is ſpread abroad on the ſecondary parts of the nervous Syſtem.

1. As to the firſt, whilſt that of the nervous Liquor paſſes through the Head, and either of its Appendix, its chief office ſeems to be for a Vehicle of the animal Spirits, which indeed it carries along with its diffuſion, and contains them under the ſame *Syſtaſis*. Yea, this Latex ſhews various Schemes of the Spirits for the performing of ſenſe and motion; even as the humid Particles of the Air paſs through the Optick Configurations of the Rays of Light. Alſo moreover, the nutrition of the aforeſaid part and accretion or growth into a bulk, depends in ſome meaſure upon the nervous Juyce watering the ſame, as ſhall be ſhewed by and by.

2. But the greateſt queſtion is concerning this Liquor being diffuſed beyond the ends of the Nerves upon the ſecondary parts of the nervous Syſtem, and in the paſſages of them on the whole Body; to wit, whether ſuch a Juyce be nouriſhing of all the ſolid parts, or of ſome of them by themſelves, as Authors variouſly think; or to what other office it is deſtinated.

Concerning

Concerning theſe it firſt appears, that the Brain and Nerves, with the Juyce flowing out of them, contribute matter, or at leaſt ſome influence to the work of nutrition; the which if it ſhould chance to fail (a ſign of which defect is, if the animal Faculty falters in part) the nouriſhment there is wont preſently to be hindred or perverted. This is plainly ſeen in the Palſie, excited from an evident cauſe, without any previous Dyſcraſie of the blood, where ſuddenly an Atrophy follows the privation of motion or ſenſe, or of both together. Further, in the Scurvy, where the taint hath corrupted the nervous Juyce, when the ſick begin to be afflicted with the Vertego and ſwimming of the Head, and with wandring pains, Convulſions, and a frequent looſning of the Members, the fleſh falls preſently away, as in a Conſumption, and without any fault of the Lungs, the ſick wither away, as if diſtempered with a Phthiſis. It is a vulgar obſervation, That from the immoderate uſe of *Venus*, alſo from an inverate Gonorrhœa, from Strumous or running Ulcers, and other Impoſtumes, by which much of the nervous Juyce is waſted, a leanneſs or waſting of the whole Body is produced. Certainly, if I be not deceived, there are ſome Atrophies, yea, and ſorts of breakings out, which ſeem to depend wholly upon the defect or the evil diſpenſation of the nervous Juyce, when the blood, as to its quantity and diſpoſition, is not much in fault. Laſtly, the conſideration of ſome Diſeaſes and Symptoms ſo plainly confirms the diffuſion of the nervous Liquor and its great influence on all the parts, that there is even left no room for doubting.

Alſo no leſs doth the curing of ſome Diſeaſes and the uſe of Remedies confirm the ſame. For from hence a reaſon is taken, wherefore Cephalick Plaſters oftentimes yield ſuch ſignal help in the *Phthiſis*; not becauſe they ſtay the *Catarrh* of the Serum falling down on the Lungs, (as the common people think) but becauſe by corroborating the Brain they reſtore the diſpoſition of the nervous Juyce, before vitiated. For this cauſe it is, that ſome diſeaſes being ſtirred up by the fault of the nervous Liquor, of which ſort among others are Cancrous and Strumous Ulcers, or ſuch as come of the Kings-Evil, are hardeſt of all to be cured; becauſe the morbid tincture of the Brain, and of the *Latex* watering it (whether it be innate or acquired) is not eaſily mended: yet ſometimes when the root of the diſeaſe, lurking in the Brain or nervous ſtock, is taken away by the help of Nature it ſelf, or by Chance, by the uſe of ſome remedy; preſently the Symptoms of other parts, though neglected in the whole, vaniſh, not without the ſuſpicion of a miracle. But how much the alteration of the Brain ſerves for the curing of ſome moſt grievous diſeaſes, ſome Inſtances taken from the Farriers Art will clearly ſhew.

For when many Medicines and Methods of Adminiſtrations are wont to be tryed in vain for the curing the ſtinking diſeaſe in Horſes, commonly called the *Farcy* (which *Helmontius* aſſerts to be like the French Pox, and the author of its Contagion) the moſt certain means of curing (which I have very often known to be applied with good ſucceſs) conſiſts in this; that ſome ſharp Medicines, of which ſort are Hearts-eaſe, Water-Pepper, Ranunculus or Crowfoot, and the like, which very much abound in volatile Salt, being bruiſed into a maſs, and put into the Ears of the diſeaſed Horſe, and kept there for twenty four hours: it is ſcarce credible by what means all the Ulcers are preſently dryed up, and the diſeaſe healed, as it were by Inchantment, is quickly profligated in the whole. For ſince this Application is made far from the affected parts, without any alteration of the bowels or the blood, it ſhould be ſo healed at a diſtance; certainly the cauſe of ſuch an Energy muſt only be, that by this kind of Medicine the Dyſcraſie or evil diſpoſition of the Brain and nervous Juyce is taken away, and ſo the firſt root of the ſickneſs being cut off, the ſhoots and fruits preſently wither. It were worth our labour to try ſuch kind of Experiments that alſo in our Medicines. Yea it may be well ſuſpected, that ſuch a way ought to be ordered for the common Cure of the Kings-Evil. Among our Country-men, as delivered from our Anceſtors, it is thought the ſeventh Son, or he that is born the ſeventh one after another in a continued ſeries, can cure this diſeaſe by ſtroking it only with his hand; and truly I have known many, whom no Medicines could help, to have been cured in a ſhort time only by that remedy. Few doubt but that this diſeaſe is wont to be cured often by the Touch of our King. The reaſon of ſuch an effect (if it be merely natural) ought to be aſſigned not to any other thing than that in the ſick (eſpecially thoſe of ripe age) the Phantaſie and ſtrong Faith of the hoped for Cure induces that alteration, or rather ſtrengthning to the Brain, whereby the morbid diſpolition radicated in it is profligated. But I ſhall return from whence I am digreſſed, to inquire what the nervous Juyce contributes to nutrition.

2. I ſay therefore ſecondly, although nutrition depends in ſome meaſure upon the influence of the nervous Juyce, yet it is highly improbable, that all the ſeveral parts of the whole Body ſhould be nouriſhed only by this proviſion. For beſides that this, were to impoſe upon the Government of the Soul it ſelf, and its primary Organs, the cooking office of nutrition wholly unworthy the excellency and dignity of thoſe parts; it ſeems alſo that the nervous Liquor ſhould be all together unfit for the adminiſtring to this Province: becauſe when oftentimes immenſe expenſes are made of the aliment to be aſſimilated into the ſubſtance of the ſolid parts, eſpecially by immoderate ſweat, alſo by continual labour and exerciſe, which Country-men and Labourers daily uſe, it is not poſſible that ſuch loſſes ſhould be repaired only by the nouriſhment ſupplied, or ſent through the ſmall paſſages of the Nerves.

When I had long and ſeriouſly conſidered with my ſelf concerning this thing, what I at length thought, I ſhall tell you freely, and without any covering, or making any reflection, or blaming the Opinions of others. It ſeems firſt, that the nouriſhing matter of the whole Body is diſtributed into all parts from the blood through the Arteries; yet it may lawfully be thought, that the converſion of this matter into nutriment, and the aſſimulation of it into the ſubſtance of the part to be nouriſhed, is performed by the

the influence and help of the nervous Juyce, as it were of a certain ſpirituous Ferment. As to the firſt we have already noted, that the ſanguiferous Veſſels do not only follow almoſt every where the Muſcles and Bowels, but alſo the Head and its Appendix, yea the Membranes, Bones, and Nerves themſelves, and affix to them all thick ſhoots, as ſo many little chanels, for the receiving the nouriſhment. Moreover, as there is a purple craſſament or thick ſubſtance in the blood, whoſe ſubſtance ſtuffs and nouriſhes the Pores of the Parenchyma of the Muſcles; ſo there is a whitiſh Gelly, by which the Membranes and the whiter parts ſeem to increaſe. Beſides it may be obſerved, that the blood it ſelf increaſing, contains in it ſelf fibres and ſmall threads, ſuch as are interwoven in the Muſcles and nervous parts; and if the ſame ſtand long in any Veſſel, it is preſently coagulated into longiſh, white, and hard cruſts or bits, whoſe ſubſtance is plainly fleſhy; ſo that the blood produces fleſh of it ſelf, though the ſame be rude and unformed: wherefore the configuration and the apt diſpoſition of the nouriſhingmatter, ſupplied from it, depends on the coming and Energy of the nervous Juyce: ;but after what manner this is done, we ſhall endeavour now to ſhew.

After the web or ſtuff of all the parts is laid, it is required then that they be both drawn forth in due proportion,and grow in ſubſtance,and alſo that the little ſpaces which are left by reaſon of the Effluvia's perpetually falling off, may be continually filled with the nouriſhing ſubſtance caſt in. In theſe two things the buſineſs of nutrition chiefly conſiſts; for the performing of either of which the blood affords matter, and reaches it forth (as was ſaid) in the circulating to the ſeveral parts of the concrete, and as it were ſtands at the doors of the part to be nouriſhed: yet, that this matter may be rightly diſpoſed, and its particles, to wit, the thick and thin, ſaline and ſulphureous, and others of a ſeveral nature, ſeparated one from another, may be imployed with ſome choice to the deſtinated uſes, there ſeems need of a certain directing faculty, and as it were plaſtick virtue, got ſomewhere elſe than from the blood it ſelf. For indeed the blood being deſtitute of animal Spirits, is unfit for the performing theſe offices. Wherefore, for that it appears there doth lye hid in the nervous ſtock, a certain juyce, and the ſame being gifted with animal Spirits to be diffuſed to all parts, how can we ſuppoſe leſs but that this ſubtil and ſpirituous Liquor, every where meeting with the arterious which is duller and thicker, actuates and inſpires it, and as it were ordains it for the performing the deſigned work of nutrition? eſpecially when it plainly appears, that by reaſon of the defect or depravation of this nervous Juyce, nutrition is always fruſtrated or perverted.

Therefore it may be lawful, in the difficult Controverſie concerning the Matter and Method of Cure, to propoſe this our Hypotheſis, though it be a Paradox and very abſtruſe; to wit, that the nervous Juyce (which we have ſaid was like the male ſeed) is poured out with the nutritious humor copiouſly ſuggeſted from the Arteries, as it were the genitive or ſeed of another Sex, every where upon all the parts; and that this former, being indued with active Elements, imbues the more thick matter, as with a certain Ferment, and impregnates it with animal Spirit; and when it ſo makes it, with a mutual entring in or coming together, to be diſſolved and to go into parts, its particles being extricated one from the other (the Spirit infuſed helping) they are put upon bodies of the ſame meaſure with themſelves, and are aſſimilated into their ſubſtances. In the mean time, becauſe the animal Spirits are poured out in great plenty with the nervous Juyce, thoſe which are at leiſure from the work of nutrition, or remain after that is finiſhed, turn aſide every where into the Fibres, as into proper dwelling-houſes, and there being ready for the offices of ſenſe and motion, ſtay; which offices indeed, that thoſe Spirits the Inhabitants of the Fibers, may the better perform, they acquire from the blood watering the Muſcles, certain auxiliary forces, wherefore they being endued with a certain elaſtick force, are apt to be highly rarified and as it were exploded.

But indeed we ſuppoſe, that as the nervous Liquor, being turgid with animal Spirit, cauſes the arterious humor to become nutritious; ſo in compenſation of this the animal Spirits remaining of the work of nutrition, and every where diſpoſed within the Fibres, receive from the arterious blood a mixture or certain Copula; by whoſe help and cooperation the ſame Spirits exert or put forth much more ſtrongly their locomotive force. For it ſeems that little ſulphureous bodies are added to the ſpirituous-ſaline particles from the watering blood; and ſo when the animal Spirits are furniſhed with this Copula, they being ſtirred up into motion, ſhake off the borrowed particles, which being ſtruck with a certain force, like the exploſion of Gun-powder, ſuddenly intumifie the Muſcles, and ſo by contracting them very much, they cauſe a vehement motive endeavour. We ſhall have an occaſion of diſcourſing more at large of this, when we treat of the Motion of the Muſcles.

Yet in the mean time, we ſhall take notice, that the Muſcles of the whole Body, as to their motion, have a certain Analogy with the motion of the Heart. For indeed the animal Spirits in the Heart,flowing within the fibres and nervous threads, (with which this part is much beſet) receive plentifully ſulphureous little bodies from the inflowing blood diſtending the ſides of either boſom, which whilſt the ſame Spirits, being filled to a fulneſs,ſhake off and as it were explode,a *Syſtole* of the whole Heart(its ſides being carried with a certain force inwards) is brought in or cauſed, whereby the blood, from either ſide the boſom is caſt out as as it were by the impulſe of a Spring or Bolt. Truly, unleſs the Spirits inhabiting the Heart, ſhould receive food and matter of exploſion from the blood it ſelf, their ſtock,ſupplied or ſent by the paſſage of the few and ſmall Nerves, would not ſuffice for the performing of the undiſcontinued motion. A ſign of this is, that from a defect or depravation of the blood, as well as of the animal Spirits,

Spirits, the motion alſo of the Heart is defective or diminiſhed. And not much unlike in the Muſcles as in the Heart, is the buſineſs performed; the Spirits inhabiting their Fibres, receive a ſulphureous Copula and apt for exploſion, from the blood there more plentifully flowing than about the Membranes, with which being endued, as often as they receive from the Nerve as it were the fiery inkindling or the match, the inſtinct of the motion ſo to be performed, they being excited, and ſtriking off their Copula, very much inflate or blow up the Muſcle, and intumifie it for performing or compaſſing the motive endeavour. Nor is it much to purpoſe, or makes any great difference, that the motion of the Heart, ſtirred up by a perpetual inſtinct is found always neceſſary; but the Muſcles the moſt of them only occaſionally and at the command of the Animal, do put forth their motive power; for the *Diaphragma* and ſome Muſcles, dedicated to Reſpiration, are urged with a perpetual *Syſtole* and *Diaſtole*, as well as the Heart it ſelf.

From the aforeſaid Hypotheſis concerning the offices and uſes of the nervous and arterious Juyce, Arguments that otherwiſe determine the work of Nutrition, may be eaſily anſwered. For that the blood is ſaid rather to prey upon the ſolid parts than to repleniſh them, that ought to be attributed to the Diſeaſe and Dyſcratie of it, and not to it ſimply: becauſe ſometimes the blood is accuſed, for that it too much ſtuffs the ſolid parts; to wit, foraſmuch as its maſs being wateriſh and weak, it lays aſide the alible Juyce (which not being truly cook'd, is ſtill crude and vicious) with very great plenty about the habit of the Body, and ſo induces an *Anaſarcha*. In the mean time it ought to be granted, That as it is the blood that is evil which heaps up too much vicious nutriment; ſo it is the ſame, which being well and right, doth laudably perform the office of Nutrition.

But that it is argued, That the nervous is rather the nouriſhing Juyce, becauſe by reaſon of its defect, depravation or too prodigal expence, the acts of nutrition are wont to be hindred or perverted; it is eaſie to reply to this, That the impediments of the nervous Juyce, being made vicious, reſpect the form of nouriſhment, and not the matter of it: to wit, it ſometimes happens, that the blood diſpenſes the alible matter in due plenty and diſpoſition; which notwithſtanding, by the fault of the nervous Juyce, is not rightly aſſimilated. When an impotency of motion comes upon a too great diſtenſion of the Muſcle or Tendon with pain, ſhortly nutrition being hindred, a Jelly grows about the diſtempered part: which notwithſtanding drops not out of the Nerve (as is commonly ſaid) but the glutinous humor being poured out of the Arteries for aliment, for that it cannot be received by the hurt part, is gathered together there: nor is it to be thought, that Tumors, or Strumous Ulcers or the running Sores of the Evil do contain or pour out only a nervous humor, ſince the matter of either is for the moſt part bloody, which by reaſon of the evil Ferment of the nervous Juyce, puts on a ſtrange form, and that diverſly degenerous.

This ſuppoſition of the twofold Humor, for the matter and form of nouriſhment, is taken to be of egregious uſe for the ſolving of the moſt difficult *Phænomena*, which are met with about the Diſtempers of the Brain and nervous Juyce: yea that Pathology, ſeriouſly conſidered, ſeems to infer as a certain neceſſary conſequence, that a twofold Juyce is neceſſary for the work of nutrition; as ſome other time perhaps we may ſhew. In the mean time, leaving this Speculation, we ſhall proceed to the remaining Task of our *Anatomy*, to wit, the *Neurologie* or of the *Nerves* in particular.

THE Description and Use OF THE NERVES.

CHAP. XXI.

The first four Pair of Nerves arising within the Skull are described.

THE division or distinction of the Nerves, by reason of their various respects, is wont to be manifold: to wit, as they are either soft or hard, singular or numerous in their beginnings; or that they serve either to the faculty of Sense or Motion, or to both together. But they are commonly distinguished, That some Nerves arising within the Skull, proceed from the *oblong Marrow*; and others going out of the joynts of the *Vertebra*, are derived from the spinal *Marrow*. But besides these, another manner of differencing them seems best to us; to wit, That some Nerves, as it were Clients and Servants of the Brain, perform only spontaneous Acts, and others, Ministers and Servants of the Cerebel, are imployed only about the exercises of the Involuntary Function. There will be no need to assign different Essences or Constitutions of Nerves according to these several differences: but rather that there be instituted a particular Censé or Muster of them, and following the order of Nature, that we especially unfold every one of them in the series in which they are disposed in the animal Body.

Among the Nerves arising from the Skull, the smelling Nerves, or those which are commonly called the Mammillary Processes, lead the way; for that they have their rise before all the rest, and are stretched out forward beyond the Brain it self. These Nerves go out of the shanks of the oblong Marrow within the chamfered bodies and chambers of the Optick Nerves; and being endued with a manifest cavity, open into the first Ventricle of the Brain on either side behind the same chamfered bodies; so that the humidity flowing between the folding of the Brain, is carried through these chanels into the mammillary Processes; whether they go farther forward, shall be anon inquired into: Because these Nerves being broad and large, arising near the chamfered bodies, and from thence stretched forward under the Basis of the Brain, their bulk is increased by degrees till they go into the round Processes like Paps, by which either bosom of the Cribrous or Sieve-like Bone is besmeared. Within the Socket of this Bone these Nerves, as yet soft and tender, obtain Coats of the *Dura Mater*; with which being divided into many fibres and filaments, and passing through the holes of the Sieve-like Bone, they go out of the Skull: from whence being dilated or carried forward into the caverns of the Nostrils, and distributed on every side, they are inserted into the Membrane bespreading those Labyrinths.

If we enquire into the nature and use of these parts, without doubt the mammillary Processes and their medullar roots, with the fibres and small threads hanging to the same, are truly Nerves, and serve properly for the very Organ of the Smell. Seeing these conduce to the sense only without any local motion, therefore (even as the other hearing Nerve) whilst they are within the Skull, they are plainly medullar and soft; whereby the Animal Spirits more easily moved within the more tender substance of the Nerves,

Nerves might convey more readily and accurately to the common Senſory the Ideas or Forms of the ſenſible Species: But becauſe the Effluvi's or odorous breaths to be received by the naked Organ, carry oftentimes with them ſharp and pricking Particles hurtful to the Brain and Nerves; therefore in the firſt courſe theſe Nerves being about to go out of the Skull, borrow Coats from the *Dura Mater*, which ſerve for Armour. Further, as theſe breaths (leſt they ſhould ſtrike more ſharply by ruſhing impetuouſly on the Senſory) being admitted only by little and little, and by ſmall bands, ought to be brought through divers narrow turnings and windings of the Noſtrils; therefore that theſe Nerves may the better receive the effluvia's flowing within the ſeveral dens, they are ſo divided into very many fibres and ſmall threads or filaments, that there may be no paſſage of the Noſtrils to which at leaſt ſome of them are not deſtinated. And after this manner, although the exhalations, as it were torn into little Clouds, are received by the nervous filaments, and ſo care is ſufficiently taken, that they being more thickly elevated, may not overwhelm or obſcure the Senſory; yet leſt any thing ſharp and troubleſome ſhould be carried with them to the Brain, the cribrous bone is ſet before the doors as an obſtacle, through whoſe little holes being ſtrained, they may put off all ſharpneſs. And laſtly, they being carried through the ſofter Nerve, as it were another Medium, and ſo broken again, they at length being ſoft and gentle enough, are ſtaid at the firſt Senſory.

But that theſe Nerves are noted through the whole with an open hollowneſs within the Skull, the reaſon ſeems to be, that the watry humor ſtilling out of the foldings of the Brain, and being derived into thoſe chanels, might beat back and temper the impreſſions of the odours, when too ſharp and fiery; for as the humors included in the Eye, variouſly refract the viſible Species, whereby it paſſing at laſt through the Optick Nerve without any force, ſlides pleaſantly to the common Senſory; ſo it is not improbable, that the water contained within theſe paſſages of the Nerves, does in like manner ſweeten the ſpecies of the odours, and prepare them in ſome meaſure for the Senſory. Wherefore it is obſerved, that Cattle and Beaſts which are fed with herbage, have the mammillary Proceſſes exceeding large and always full of water; to wit, leſt the odours of the herbs continually attracted by them (unleſs their force ſhould be blunted after the aforeſaid manner) might hurt or overthrow their more weak brain. Beſides, it is very likely that this watry juyce falling down from the infolding of the Brain, doth not only flow into the open chanels of the Nerves and the mammillary Proceſſes, but alſo doth paſs through by the paſſage of the fibres and filaments the holes of the Sieve-like bone, and doth wet and continually moiſten the cavities of the Noſtrils, apt to be dryed or torrified too much by the Air thither attracted, and by the breath continually blown out. For it clearly appears, as we have elſewhere ſhewn, that the ſerous humors creep through the blind paſſages of the Nerves and Fibres, and by them wander from place to place. Yea it may be thought, that not only water, ſufficient for the watering the Noſtrils, doth by this way ſweat through; but alſo whenſoever the ſerous heap is gathered together in the Ventricles of the Brain, its ſuperfluities or the excrementitious humor doth very often paſs through the cribrous Bone by the paſſage of the Fibres, and is ſent out. But we have in another place diſcourſed more largely of this.

The ſmelling Nerves, which have within the Skull their mammillary Proceſſes depending on them, are much greater in an Ox, Goat, and in Cattle, and ſuch like beaſts that live on herbage, than in fleſh-eating Animals; to wit, becauſe in thoſe there ſeems to be more need of the ſenſe of ſmelling to be more exquiſite for the knowing the virtues of the manifold herbs. Alſo theſe Nerves are larger in all Brutes than in Man: the reaſon of which is, becauſe they diſcern things only by the ſenſe, and eſpecially their food by the ſmell; but Man learns many things by education or nurture and diſcourſe, and is rather led by the taſte and ſight, than by the ſmell in chuſing his aliments. Theſe Nerves in Birds, as alſo in Fiſhes, are conſpicuous enough; for either of theſe, even as four-footed beaſts ſeek out and chuſe their food by the help or knowledge of the ſmell.

As to the Fibres and Filaments or little ſtrings ſtretching out from the more ſoft Nerves through the holes of the Sieve-like Bone into the caverns of the Noſe, theſe are found in all Creatures who have the mammillary Proceſſes: ſo that it is not to be doubted, but that theſe Proceſſes, with this Appendix and its medullary origine, is the Organ of the Smell. And what more confirms this thing, theſe filaments or little ſtrings are far more, and more remarkable in hunting Hounds than in any other Animal whatſoever. But beſides theſe Nervulets drawn through the holes of the Sieve-like Bone into the Noſtrils, two branches alſo are ſent hither from the fifth pair, and diſtributed into both the Noſtrils. The reaſon of this ſeems to be, becauſe though the Nerves but now deſcribed, or of the firſt Conjugation, are properly ſmelling Nerves, and effect by themſelves the ſenſe of Smelling; yet theſe are aſſiſted or joyned with other Nerves, alſo by thoſe ſent from the fifth pair, becauſe the Organ of the Smell ought to have a conſent with all other parts, which thoſe ſubſidiary Nerves, by reaſon of the manifold branching out of the fifth pair, are wont to perform. It chiefly appears, that there is a certain nearneſs or ſtrict affinity between the taſte and the ſmell: and the cauſe of this conſiſts, in that out of the ſame Trunk of the fifth pair certain Nerves are ſent to the Palate, and others to the Noſtrils. Concerning the reaſon of that wonderful conſent which the Noſtrils have with the *Præcordia* in ſneezing, alſo wherefore that light titillation ſtirs up a Cough, ſhall be ſpoken of hereafter, when we come to unfold the fifth pair and the intercoſtal Nerves. But in the mean time we ſhall take notice, that although many Nerves belong to the Organ of Smelling, yet that ſenſe is properly performed by the Fibres interwoven in the inward Coat of the Noſtrils: for thoſe Fibres being ſtruck by the ſenſible object, move and contract themſelves variouſly according to the Idea of the

impreſſion; which Affection of them being carried by the paſſage of the *Nerves* to the Head, foraſmuch as it is there ſtaid by the common Senſory, cauſes the perception of the ſenſe. Thoſe ſenſible Fibres are diverſly figured in ſeveral Animals; which is the reaſon, why odorous things do not alike affect all Animals. For what things by a mans noſtrils, as endued with too ſharp and pricking Effluvia's, are eſteemed highly naught and ſtinking, as eſpecially are dung and putrid fleſh; the ſame are to Dogs, whoſe Organ of Smelling is made or conſiſts of more robuſt or ſtrong Fibres, and proportionate to thoſe Effluvia's, as very grateful and choſen for food.

The ſecond Conjugation are the Optick or ſeeing Nerves: concerning which we have ſhewn already, in the *Anatomy of the Brain*, after what manner they ariſe from behind the chamfered bodies out of the ſecond ſection of the medullar ſhanks (which *Galen* calls the *Chamber of the Optick Nerve*) and deſcending from thence with a certain compaſs are united, and being again ſeparated and carried into the Ball of the Eyes, conſtitute with diffuſed Fibres the hard Coat. Moreover, in thoſe Obſervations we did but now take notice, that the Trunk of this *Nerve* growing a little hard without the Skull, was as it were a little bundle of very many Fibres or ſmall ſtrings growing together into one, and of produced Parallels, as it ſhould ſeem for that end, that the animal Spirits, flowing in the whole *Nerve*, might be moved in ſo many lines or direct rays; to wit, whereby they may carry the viſible Species, ſufficiently refracted in the Eye, thence to the common Senſory by a direct beam, and not intorted or rolled about.

As often as in the diſtempers of the Eyes blackiſh pricks or concatenated pieces of any thing ſeem to be rolled before the Eyes, it is likely that this apparition is ſo made, becauſe certain filaments or ſmall ſtrings of the *Optick Nerve* are ſhut up, which when the light cannot paſs through rightly, as through the reſt, ſo many as it were ſhadowy ſpaces appear in the middle of the clearneſs. Theſe Nerves, becauſe they only ſerve for the ſenſe, are therefore more ſoft within the Skull: but becauſe there may be need perhaps, that the Trunk of this *Nerve* ought to be ſometimes dilated or ſpread abroad, ſometimes bound cloſe together or contracted according to the divers appearance and incourſe of the objects; therefore very many Fibres, being ſent out from the motory or moving *Nerves* of the Eyes, do every where compaſs and bind it about, and entring with it into the Ball of the Eye, are inſerted partly near the root of the Optick *Nerve*, and partly penetrate more deeply the Sclerotick or hard Coat it ſelf.

Further, the *Optick Nerves* are not only bound or environed with nervous Fibres ſent from the third pair, but (as we have ſhewn above) with ſanguiferous Veſſels in their whole proceſs. The office of which certainly is, both that there might be every where about the greater Trunk of this *Nerve* as it were a continual heat or ſufficient fire-place; alſo perhaps, that the food of the bloody humor might be ſupplied to the Spirits, living there within the Trunks of the *Nerves*, far from the fountain, as is wont to be in other places.

Concerning the Fabrick of the Eye it ſelf, and manner of ſeeing, alſo concerning the whole dioptrick proviſion, here ſeems a fit opportunity of diſcourſing: but this were to digreſs too far from our purpoſe, to wit, the mere or naked Doctrine of the *Nerves*; and I may the better paſs by this addition, becauſe this Province hath been ſufficiently and accurately adorned by others. In the mean time we ſhall take notice, that as in the ſmelling, ſo alſo in ſeeing, the ſenſe is performed, not ſo much by the help of the nerve, as of the fibres, which are interwoven with the organ: to wit, the little fibres in the Membranes of the Eyes, and eſpecially thoſe inſerted into the Sclerotick Coat, and diſpoſed after the manner of a Net, do receive the impreſſion of the viſible Species, and by repreſenting the image of the thing, ſo as it is offered without, cauſes ſight. But it is the office of the Nerve it ſelf to tranſmit inwardly, as it were by the paſſage of the Optick Pipe, that image or ſenſible Species, and to carry it to the common Senſory.

The third Conjugation of Nerves are the moving *Nerves* of the Eyes, which ariſe in the Baſis of the medullar Stem behind the Tunnel; from whence going forwards nigh the pair of ſeeing Nerves, and going out of the Skull with the other *Nerves* deſtinated to the Eye, they are carried towards the Globe of the Eye; where being preſently divided into many branches, they provide it with moving Muſcles; but with various difference in divers living Creatures. For in an Ox, who hath got a larger Eye, the moving Nerve of the Eye imparts a branch to every one of the ſix common Muſcles; and beſides, from the Nerves of the fourth, fifth and ſixth pair certain branches are diſtributed to ſome of the ſame Muſcles: ſo that, as often as any Animal intends or applies the ſenſe for the perceiving of this or that object, theſe Nerves turn about the Eye, and compoſe it at their pleaſure for the ſpontaneous beholding of the ſame. Beſides we take notice, that the Eyes do get a diverſe kind of involuntary motion; becauſe in Fear, Shame, Anger, Sadneſs, yea and in all Affections of the Head and Heart, whether we will or no, the Eyes are reſpectively figured. Wherefore 'tis highly probable, that theſe kind of pathetick motions of the Eyes, whereof the living Creature is ſcarce knowing, are performed by the help of the other nerves, to wit, of thoſe coming from the fourth, fifth, and ſixth pair: and that more manifeſtly appears, becauſe the ſame nerves which lend their branches to the Eye, take their origines from the Cerebel, the office of which we have often ſhewn to be, to diſpenſe the Spirits for the exerciſe of the involuntary Function.

But concerning theſe Nerves of the third pair, which are properly called the Moving nerves of the Eyes, we obſerve, that in Man, a Dog, and in ſome other living Creatures they are found to be ſomewhat otherwiſe than in an Ox: for either nerve in theſe, as in the reſt, is carried out of the Skull, divided into four branches, three of which are carried from thence into three ſtraight diſtinct Muſcles, to wit, one

lifting

lifting up, the other bringing together, the third pressing close the Eye; the other branch of it goes forwards further with a single trunk, and is implanted in the middle of the Muscle going about the Eye, turning obliquely to the inward corner downwards. From these it appears, that these Muscles, to which this nerve belongs in all, are sufficient almost of themselves to perform most spontaneous motions of the Eye: but where the aforesaid nerve is divided into four shoots, it constitutes a small and round infolding, out of which many small shoots creep through, and variously compass about the trunk of the Optick nerve; for what use it is so made, we have already intimated.

The fourth Conjugation of Nerves (which we call rightly the Fourth by order and succession, although it is accounted the eighth and last by *Fallopius*) hath a diverse origine from all the rest. For whereas most of the others proceed from the foot or sides of the oblong Marrow, this hath its root in the top of it behind the round Protuberances, called *Nates* and *Testes*: from whence, bending more forward nigh the sides of the oblong Marrow, it is presently hid under the *Dura Mater*: under which going along for some space, and passing through the Skull at the same hole with the rest destinated to the Eye, it is bestowed with a single trunk, not communicating with any of the other *Nerves*, wholly on the Muscle called the Trochlean Muscle. Above we called these *Nerves* the Pathetick *Nerves* of the Eyes: for although some besides may deserve this name, (as shall be shewn by and by) yet 'tis most likely, that the proper office of these is to move the Eyes pathetically, according to the force of the Passions and instinct of Nature, delivered and remanded from the Brain to the Cerebel, and so on the contrary, from this to that through the *Nates* and *Testes*, and their medullar Processes. For, as we have shewn, that by the diverse impulse and waving of the animal spirits dwelling in this by-path, there are instituted certain mutual commerces between the Brain and the *Præcordia*, (the Cerebel mediating between either) it will be of necessity, that these *Nerves*, rooted in the middle way, should be struck by every tending downwards or remove of the Spirits, going this way or that way, and so the motions of the Eyes to follow the affections of those parts. All perfect Animals are furnished with these nerves: and in truth, as none of them but are obnoxious to Anger, Love, Hatred, and other Affections, so every little Creature shew these by the mere aspect and by the gesture it self of the Eyes. We see sometimes the greater Pike gaping for his prey first of all to roll about his eyes, and to look sour; then with a swift shooting out of his body, to invade the lesser fry of fish.

CHAP. XXII.

The fifth, sixth, and seventh Pair of Nerves are unfolded.

OF the aforesaid four Pair of Nerves, the two former seem chiefly to serve for the Sense only, but the two latter for Motion; and every single *Nerve* of them destinated to a peculiar Province: but this which follows next, to wit, the fifth Conjugation of Nerves serves for the exercise of either Faculty, to wit, both of Sense and Motion; nor is its Province so strictly bounded, that it should belong only to one member, for it is distributed to the Eyes, Nose and Palate, and the rest of the parts of the Face, and besides, helps in its part in some sort the offices and actions of the *Præcordia* and almost of all the *Viscera*.

This pair (which by the Ancients was accounted the third, by us the fifth pair, and that by right of order or polition) below the former nerves, proceeds with a broad and large trunk from the sides of the annular Protuberance or Process sent out from the Cerebel. It consists of very many Fibres gathered together, some of which are soft, others hard; so that the great trunk of it near its beginning, is nothing else than a little bundle of very many nerves, some of which are bestowed on these parts, and others on other parts, and in some they perform the offices of motion, in others of sense. But that so many nerves being destinated to so many several members, and remote one from another, yet arising together, are collected as it were into one bundle, the reason is, that in all the parts to which those Nerves belong, a certain Sympathy and consent of actions might be conserved: to wit, the communion of those Nerves is the cause why the sight and smell move spittle and please the Palate; nor by any other means are the *Præcordia* affected, according to the various conceptions of the Brain, and transmit their affections to the several parts of the Face; from whence the aspect or countenance of the whole Animal is pathetically figured, as shall be shewed more particularly below.

In the mean time, let us deliver a short Hypotype or Figure of this *Nerve*; its trunk going out of the sides of the greater Ring, sometimes near its beginning, but oftner the *Dura Mater* being first perforated or passed through, is divided into two noted branches. The first of these tending straight downward, going out of the Skull at a proper hole, in its descent towards the lower Jaw, (to whose parts it is chiefly destinated) is divided into more branches, with which it furnishes the Temple-muscle, also the Muscles of the Face and Cheeks. Moreover, from them shoots and branches are distributed into

into the Lips, Gums, roots of the Teeth, Jaws, Throat, the farther end of the Palate, yea and the Tongue; for this reaſon chiefly, that the Nerves going out of the lower branch of the fifth pair, might effect, beſides ſenſe, the divers offices of Taſte and Touch or Feeling, and motions of a various kind in the aforeſaid members and parts; moſt of which, as the chewing of the aliment, alſo thoſe which have reſpect to configuration or framing of the mouth and face in laughing or weeping (as we have already noted) are performed unknown to the Brain, that is involuntarily, and by the help of the Cerebel only, from which theſe Nerves are derived.

The other ſuperior, and alſo the greater branch of the fifth pair under the *Dura Mater* nigh the ſide of the Turkey Chair goes ſtraight forward for a little ſpace, and is inlarged into ſome ſhoots over againſt the pituitary Glandula to the trunk of the Carotick Artery or the wonderful Net, (where it is preſent) then it is inoculated into the Nerve of the ſixth pair, and from thence ſends back ſometimes one, ſometimes two ſhoots; which being united with another ſhoot, turned back from the Nerve of the ſixth pair, conſtitute the root or firſt trunk of the intercoſtal Nerve. Concerning this intercoſtal Nerve, which is made of the lower ramification or branching out of the Nerves of the fifth and ſixth pair, it ſhall be ſpoken of particularly hereafter.

Preſently after the branches or ſhoots reflected or bent back for the root of the intercoſtal Nerve, that greater Nerve of the fifth pair is divided into two noted branches. The leſſer and uppermoſt of theſe tending towards the globe of the Eye, and becoming again twofold, ſends forth two branches from it ſelf; one of which turning towards the inward ſide of the Bone, containing the ball or angle of the Eye, is divided into two ſhoots. The other of theſe having paſſed through the Bone nigh the mammillary Proceſſes, is carried into the noſtrils: the office of this Nerve is to keep a Sympathy and conſent of action between the Noſtrils and ſome other parts: but the other branch of this diviſion is beſtowed on the Muſcle by which Brutes wink.

The ſecond Ophthalmick branch of the fifth pair is divided into four or five ſhoots, all which going forward above the Muſcles of the Eye, and in ſome part paſſing through its Glandula's, are almoſt all loſt in the Eye-brows, unleſs that in the paſſage they ſend down two ſmall ſhoots which enter the *Sclerotick* Coat a little below the Tendons of the Muſcles, and reach to the *Uvea*, or the fourth thin Membrane that cloaths the Optick Nerve; yea and alſo ſend in the paſſage ſmall ſhoots to the Glandula's of the Eye. It ſeems that theſe Nerves of the fifth pair, being diſtributed into the Glandula's of the Eyes and Eye-brows, ſerve chiefly to the involuntary and pathetick actions of thoſe parts; the chief of which are, the languiſhing and mournful aſpect of the Eyes in weeping, and the unwilling pouring out of tears. For as the lower branching of the fifth pair, to wit, the intercoſtal nerve, provideth in man for the *Præcordia*, it eaſily happens, that from the ſad affection of theſe, the Cardiack branches of this *Nerve* being forced and wrinkled into Convulſions, the aforeſaid Ophthalmick branches alſo ſo correſpond, and by wrinkling the Eye-brows, and by compreſſing the Glandula's, produce thoſe kind of looks of the Eyes, and marks of ſorrow and grief. Further it is obſerved, that from the Ophthalmick branch of the fifth pair a certain ſhoot is ſent back higher nigh the heads of the Muſcles; which when it has paſſed through at a proper hole, the Bone containing the ball of the Eye, is carried ſtraight into the caverns of the Noſtrils. Hence, as I think, a reaſon may be given, wherefore paſſing out of a dark place into the light, at the firſt beholding of the Sun, preſently whether we will or no we ſhall ſneez; to wit, the eyes being too ſtrongly ſtruck by the object, and being ſuddenly and diſorderly moved, that they might turn themſelves aſide, the ſame affection is immediately comunicated through the aforeſaid *Nerve* to the Membrane covering the hollow caverns of the Noſtrils, which being thence contracted and wrinkled, (as it is wont by ſome ſharp thing pulling it) provokes ſneezing.

The ſecond or greater branch of the ſecond diviſion of the Nerve of the fifth pair being carried nigh the ball of the Eye, is again divided into two branches. The lower of theſe being bent downwards, cleaving into many ſhoots, is beſtowed on the Palate and upper Region of the Jaws: The other and higher branch of this ſecond diviſion ſtretching beyond the ball of the Eye, paſſes through, together with the Vein and Artery, a proper hole made in the bone of the upper Jaw; which Veſſels this *Nerve* climbs and variouſly compaſſes about with many ſhoots ſent forth; then ariſing out of the bone, it imparts little branches to the Muſcles of the Cheeks, Lips, Noſe, and to the roots of the upper Teeth. Therefore foraſmuch as this *Nerve* embraces and binds about the ſanguiferous Veſſels deſtinated to the Cheeks and the other parts of the Face; from hence a reaſon may be given, why the face is covered with bluſhing by ſhame: for the animal Spirits being diſturbed by the imagination of an unſeemly thing, by and by endeavouring as it were to hide the face, their irregularities enter this *Nerve*, ſo that the ſhoots of the ſame *Nerve*, embracing the blood-carrying Veſſels, by compreſſing and pulling the ſame, cauſe the blood to be more forced into the Cheeks and Face, and the Veins being bound hard to be there for ſome time ſtaid and detained. But foraſmuch as many ſhoots and fibres of the ſame maxillar *Nerve*, derived from the fifth pair, interweave themſelves with the fleſh and skin of the Lips, hence the reaſon is plain, why theſe parts are ſo very ſenſible, and beſides, why the mutual kiſſes of Lovers, impreſſed on the Lips, ſo eaſily irritate love and luſt by affecting both the *Præcordia* and Genitals; to wit, becauſe the lower branching of the ſame fifth pair actuates theſe parts conſtituted in the middle and lower Belly, and draws them into the like affection with the Lips. The ſame reaſon holds of Love preſently admitted by the eyes, that as the Poet ſays,

Mars *videt hanc, viſamq; cupit.*
As ſoon as *Mars* ſaw her, he deſir'd her.

We

We have but now intimated, that many ſhoots of this Nerve were deſtinated for the buſineſs of chewing; and therefore, becauſe the aliments to be taken ought to undergo not only the examination of the taſte, but alſo of the ſmell and ſight, from the ſame Nerve, whoſe branches being ſent to the Palate and Jaws, perform the buſineſs of chewing, other ſhoots, as it were fore-runners, are carried to the Noſtrils and Eyes, to wit, that theſe Organs of the other Senſes might be furniſhed with ſome helps of probation alſo, for the better knowing or diſtinguiſhing the objects of taſte. Certainly from the nearneſs of kindred and manifold affinity of this Nerve, being alſo much diffuſed in the Head, the mutual dependencies and confederations of very many of its parts, proceed. But how this Nerve in other Provinces, to wit, in the *Thorax* and lower belly, and there about the motions and ſenſions of the *Præcordia* and *Viſcera*, doth cauſe various Sympathies of them among themſelves and with other parts, ſhall afterwards be more largely ſhewn, when we ſhall ſpeak particularly of the intercoſtal Nerve, which is rooted in this Nerve of the fifth pair; where, from the manifold communication of this Nerve, may be eaſily drawn the reaſons of ſneezing, yawning, laughing, crying, and of other actions merely natural. In the mean time, the ſuperior branching of the Nerve of the fifth pair ſhews it ſelf after this manner in the Head, and almoſt after the ſame manner is divaricated in moſt living Creatures; except however, that in ſome preſently after its riſe, it is divided into three great branches; one of which is deſtinated to the lower Jaw, the other to the Eye and Noſe, and the third to the Cheek.

The Nerve of the ſixth Conjugation follows, which ariſing out of the loweſt foot of the annular Protuberance, and being hid under the *Dura Mater*: preſently goes out of the Skull at the ſame hole with the nerves of the third and fourth pair, and is carried with a ſingle Trunk into the ball of the Eye; but ſo, that near the ſide of the Turkey Chair it is inoculated with the ſecond branch, or the greater of the fifth pair; from whence it turns back, ſometimes one little branch, ſometimes two; which being united with the branches of the fifth pair running back, conſtitute the beginning of the intercoſtal nerve. Then this nerve going forwards, is divided into two branches near the ball of the Eye; one of which is inſerted into the Muſcle drawing back the Eye planted in its outward angle; and the other being torn into various fibres, is beſtowed on the ſeventh Muſcle proper to Brutes; ſo that this nerve alſo ſeems to ſerve to thoſe motions of the Eye that are almoſt only pathetick, or excited by natural Inſtinct. For, as to the uſe of the former ſhoot, it plainly appears, that it is innate to every Animal in a ſudden fear to draw the eyes backward, and to look for what is to be feared on either ſide and behind: then as to its other ſhoot, whereby Brutes winke or twinkle the eye, it is obvious that this ſame motion is ſudden and extemporary, without any previous intention, whereby the eye endeavours to ſhun the injuries of outward things that occur.

The ſeventh Conjugation of Nerves, accounted for the fifth by the Ancients, is imployed about the ſenſe of hearing. Of this pair commonly are noted two Proceſſes, the one ſoft, the other hard; which indeed ſeem to be two diſtinct nerves, for that although they have their beginnings nigh one another, yet are ſomewhat diſtinct, and are carried to divers Organs; in the mean time either agreeing in a certain common reſpect of uſe or action. For whilſt one Nerve performs the act of hearing, the other ſupplies ſome requiſites whereby that act may be the better performed: wherefore we ſhall not much ſtrive againſt the common deſcription of this pair, by which it is taken for one. The proceſs of this pair, or the auditory Nerve properly, which is called the ſoft Branch, ſeems to ariſe in man out of the lower ſide of the ringy Protuberance, and in beaſts out of the midſt of the leſſer Ring. In ſome Diſſections I plainly found, that this ſofter Nerve, having its beginning lower, ſeemed to aſcend a little before it went out of the medullar ſtock; and the other more hard Nerve ſeeming to ariſe higher (*viz.* out of the medullar whitiſh line leading about the bottom of the fourth Ventricle) did deſcend a little, and aroſe near the meeting with the other. This ſofter Nerve is carried into the paſſage of the ſtony Bone, where entring into the den deſtinated for the receiving the ſound, which is on this ſide the Snail-like winding and the Drum, it ſo infolds it ſelf into the moſt thin Membrane wherewith that den is covered, that as often as the Air implanted in that cavern is moved by the ſtroke of the external Air made upon the Drum, this impreſſion ſtriking this Membrane, and ſtirring up as it were an undulation of the animal Spirits, is forthwith carried towards the common Senſory by the paſſage of the Nerve there implanted. There will be a more opportune place of diſcourſing, after what manner, and by what ſort of Organs Hearing is performed, when we ſhall ſpeak of the Senſes.

The other Nerve of this pair, or the more hard proceſs, which conduces rather to motion than ſenſe, paſſing through the ſtony Bone at an hole proper to it ſelf, ariſes near the auditory paſſage, where it preſently receives into its trunk a branch from the wandring pair brought thither; then immediately after that joyning together or coalition, it is divided into two branches: The firſt of theſe tending downwards, is beſtowed upon the Muſcles of the Tongue and the Bone *Hyoides*; the other going about the auditory paſſage, and bending more upwards, is divided into three ſhoots; the firſt of which, anſwering to the Nerve of the former diviſion, beſtows ſome ſhoots on the Muſcles of the Lips, Mouth, Face, and Noſtrils, and ſo actuates ſome exterior Organs for the forming the voice, as the former doth ſome interior Organs. The ſecond ſhoot of this diviſion diſtributes its ſhoots into the Muſcles of the Eyebrows

and

and Forehead; and the third into the Muſcles of the Ear it ſelf. The offices and uſes of all theſe have been already ſhewn, the ſumm of which is, that as often as the ſound is admitted in, eſpecially if it be any ways unuſual, new, or to be wondred at, preſently by a certain natural inſtinct the Ears and Eyes erect and open themſelves: to wit, for that end ſhoots from this Nerve are inſerted into the Muſcles of the Eye-lids and Ears, that by the paſſage of theſe, the Spirits inhabiting either Region, might be called out as it were to watch. For a like reaſon ſhoots from the ſame hard proceſs of this Nerve are diſtributed both into the Muſcles of the Tongue and of the Bone *Hyoides:* as alſo into thoſe of the Lips and the outward parts of the Mouth, that by their paſſage, the ſound being tranſmitted further to theſe Organs of the voice, it being equal or like the ſame, might officiouſly anſwer it as it were an *Echo.* That the deſcriptions of the aforeſaid Nerves might be better underſtood, I have thought good here to repreſent in the following Figure the branchings of the fifth and ſixth pair. The ſeventh pair is fitly delineated in the ninth Figure.

This Figure ſhews the Branchings of the fifth and ſixth pair of Nerves.

A. *The Nerve of the ſixth pair (which we place firſt, becauſe it is outmoſt in the Scheme) from whoſe trunk two ſhoots* a. a. *are carried into the two Muſcles of the Eye.*

A. *A ſhoot from the Nerve of the ſixth pair bent back for the root of the intercoſtal Nerve.*

B. *The trunk of the fifth pair being preſently divided into two great branches.*

bb. *Two ſhoots from this branch bent back for the root of the intercoſtal Nerve.*

C. *The diviſion of the upper part of the trunk into four leſſer branches, the uppermoſt of which* c. *being the Ophthalmick or belonging to the Eye, and entring the orb of the Eye, ſends forth four ſhoots.*

c. *The firſt being carried nigh to the ball of the Eye, is bent back into the Noſtrils.*

d. *The ſecond paſſing by the outward orb of the Eye, is carried into the Muſcles of the Forehead.*

ee. *The third and fourth are diſtributed into the Eye-lids and interior Glandula's of the Eye.*

D. *The ſecond branch of the ſecond diviſion is alſo Ophthalmick, which entring the ball of the Eye, and carried towards the outward corner of the Eye, is diſtributed into the Eye-lids and outward Kernels.*

E. *The third branch of the ſecond diviſion, or the maxillar, which paſſing by the orb of the Eye, enters an hole proper to the bone of the Jaw, in which paſſage it ſends forth a ſhoot* e. *through another hole into the chewing Muſcle, then ariſing up, it is carried out at the hole.*

f. *A ſhoot into the Muſcles of the Noſe.*

ggg. *It ſends forth many ſhoots into the upper Lip.*

F. *The lower branch or the fourth of the ſecond diviſion, which deſcending right towards the hollowneſs of the Mouth, is divided into two branches.*

h. *The firſt is diſtributed into the Gums.*

i. *The ſecond is beſtowed with many ſhoots upon the Palate.*

G. *The ſecond branch of the firſt diviſion of the fifth pair, which tending ſtraight downwards towards the lower Jaw, ſends forth in its paſſage many ſhoots.*

k. *A ſhoot of it into the Parotid Glandula's, or thoſe near the Jaws.*

l. *A ſhoot to the inward Mandible.*

m. *A ſhoot which compaſſing about the proceſs of the lower Jaws, is carried to the outward part of the exterior Maſticator.*

n. *Another ſhoot tending oppoſite to the former, having compaſſed the ſame proceſs, is diſtributed into the inward part of the ſame Maſticator.*

H. *The trunk of the ſame greater branch carried further, is cleft into many ſhoots, of which*

o. *Tends into the root of the Tongue.*

pp. *Is carried with many ſhoots into the ſubſtance of the whole Tongue.*

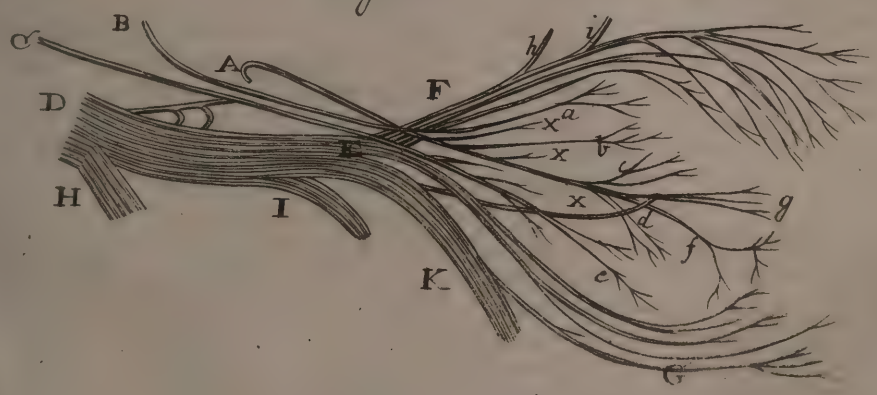
q. *Into the parts under the Tongue.*

r. *Paſſing through the bone of the Jaw, is divided into many ſhoots which are diſperſed, partly into the lower Lip* s. s. s. *and partly into the Chin* t. t. t.

The

Fig. I.

Fig. II.



The Second Figure ſhews all the Nerves, which being carried from the Nerves of the third, fourth, fifth, and ſixth Pair, are beſtowed upon the Muſcles and other parts of the Eye.

A. *The Nerve of the third pair carried to the three ſtraight Muſcles, and into the outward oblique one.*
B. *The Nerve of the fifth pair, or the pathetick Nerve, goes whole into the trochlear Muſcle.*
C. *The Nerve of the ſixth pair into the drawing back Muſcle, and the ſeventh proper to Beaſts.*
D. *The Nerve of the fifth pair whoſe Ophthalmick branch* E. *is divided into two branches,*
F. *The upper branch, being preſently torn into many ſhoots, tends directly towards the inner corner, where it is beſtowed on the Glandula's and Eye-lids.*
G. *The lower Ophthalmick branch, which being divided into ſhoots, reſpects after a like manner the Glandula's and Eye-lids towards the outward corner of the Eye;*
a. *The Nerve of the fourth pair for the trochlear Muſcle.*
b. *A branch of the Nerve of the third pair for the Muſcle lifting up the Eye-lids.*
c. *A branch of the ſame pair for the Muſcle ſhutting the Eye-lids.*
d. *A branch of the ſame Nerve for the Muſcle preſſing cloſe the Eye-lid.*
f. *A branch of the ſame for the outward oblique Muſcle.*
g. *Leſſer Nerves out of the infolding of the third pair, tending through the Sclerotick Coat into the* Uvea.
e. *The Nerve of the ſixth pair for the drawing-back Muſcle.*
*** *Fibres or leſſer branches from the fifth and ſixth pair for the ſeventh Muſcle, proper to Brutes.*
h. *A Nerve coming from the upper Ophthalmick branch into the Noſtrils.*
i. *A Nerve from the ſame branch into the Eye-brows and Fore-head.*
H. *The trunk of the fifth pair cut off, which tends to the lower Jaw.*
I. *A branch of the ſame cut off, which is carried to the Palate.*
K. *Its upper maxillar branch.*

CHAP. XXIII.

The Deſcription of the eighth Pair of Nerves.

THE Conjugation of the Nerves of the eighth pair, accounted by the Ancients for the ſixth, is called the Wandring pair; to wit, for that its Nerve, not content with one member or region of the Body, is thought to reſpect divers parts, and thoſe different, and ſituate at a great diſtance one from another, and to reach forth its branchings, not only in the neighbourhood about the Head and Neck, but through the whole cavity of the middle and loweſt Belly, and to moſt of the Bowels in either. But indeed this nerve hath a province large enough, yet not ſo diffuſe as is commonly thought: for many other nerves, inoculated into this, joyn themſelves with it, and are accounted a part of it, although they have diſtinct beginnings, and going away again from the nerve of the eighth pair, have peculiar divarications, and different from it. Wherefore, that we may give to each its own, we ſhall endeavour to proſecute this nerve of the wandring pair from the beginning to the end; and alſo ſhew the confederations and coincidences or joynings together of others with it.

The eighth Conjugation therefore of the Nerves ariſes below the auditory or hearing nerves out of the ſides of the oblong Marrow, its root conſiſting of numerous Fibres. In a man there are at leaſt twelve, ſome of which are greater, others ſmaller; to which is added a noted Fibre, or rather Nerve, much greater than the reſt, from the ſpinal Marrow, which being joyned with them, and wrapped about with the ſame Coat, taken from the *Dura Mater*, goes forth together out of the Skull, as if they all grew into one Trunk: but that acceſſory nerve, yea and many other Fibres, do ſtill remain diſtinct under that covering and afterwards departing aſunder, are carried into peculiar provinces.

Becauſe this ſpinal Nerve having paſſed the Skull, leaving its Conjugation, is carried to the muſcles of the Neck and Shoulders; beſides, the noted Fibre, out of the beginning of the wandring pair, is preſently carried into the hard proceſs of ſeventh Conjugation; and two other Fibres, having preſently left the company of the reſt, go into the muſcles of the Throat and Neck: but the reſt of the Fibres, being collected together, go forward ſtill as Companions, and inſtead of their other Companions which departed from them, they preſently get new in their places; to wit, ſometimes the whole trunk of the intercoſtal nerve it ſelf, as is ſeen in moſt four-footed Beaſts, ſometimes only a branch of it comes to them, as is obſerved in Man and ſome other living Creatures.

In this place where the trunk or branch of the intercoſtal Nerve is inoculated into the trunk of the wandring pair, a noted infolding is conſtituted, to wit, the trunk of the nerve being there made greater, ſeems to be lifted up, and to grow out into a certain Tumor like to a callous or ſinewy-ſwelled body: here, for that it is ſomewhat long, it is called by *Fallopius* the Olive body; of which ſort the ſame Author affirms, there comes to this nerve ſometimes one, ſometimes two; but in truth, one is conſtantly found in the trunk of the wandring pair, but the other in the neighbouring intercoſtal.

Of theſe ſort of infoldings in general we ſhall take notice, that they are made in the Nerves, as joynts in a Cane, or knots in the ſtem of a Tree, *viz.* as often as a branch goes out of the trunk, or ſliding into another place, is received into the ſame; and whem oftentimes ſome ſhoots go away from the place, and others come to it, the infolding there becomes greater; and ſo the more branches and ſhoots do happen to come together any where, or to go out of a nerve, the greater the bulk and magnitude of the in folding is increaſed: but if at any time a branch ſeems to proceed from any nerve without conſtituting an infolding, in truth, being included only in the ſame Coat, it is not accounted ſo much a branch as a companion which by a paſſage long before, had gone together forwards, as a ſingle nerve it ſelf, and diſtinct enough nor was it at all inoculated before its departure. But the uſe of theſe ſame infoldings ſeems to be the ſame with the knots in the ſtem of a Tree, or ſuch as the turnings aſide or by-paths that lye near croſs-ways; to wit, that when the animal Spirits, together with the nervous Juyce, inſtitute divers journies, leſt mutually, meeting, they ſhould be confounded, they may be able to turn aſide a little, and depart one from another till they may recover their orders and juſt method.

In the Deſſection of the Nerves, which are diſtributed to the *Præcordia* and *Viſcera*, the two Ganglioform infoldings, to wit, the aforeſaid in the trunk of the wandring pair, and the other near growing in the intercoſtal nerve, are as it were two bounding ſtones, which being firſt diligenly traced, the other threads of the Anatomical task, both on this and that ſide, are eaſily handled. But that theſe infoldings may be found, the trunk of the *Carotidick* Artery is laid open on both ſides between the Muſcles of the Neck; then by following its tract, the aforeſaid Olive bodies come into view about the inſertion of the lower Mandible; out of which, both the upper beginnings and the lower branchings of either nerve, may be deſigned or drawn. But becauſe about this place the nerves begin to be figured otherwiſe in a Man than in Brutes; that the reaſon of the difference may be known, we will here proſecute apart and diſtinctly the *Neurologie* or Doctrine of the Nerves of either, and firſt we ſhall deliver the *Hypotheſis* of the wandring pair, and its confederations with the intercoſtal and other nerves, as they are found in Man.

The Ganglioform infolding therefore being conſtituted upon the Trunk of the wandring pair, receives one Nerve ſent into it elſewhere, and ſends forth another from it ſelf. To this is brought a ſhoot from the intercoſtal nerve different from moſt brute beaſts, where the whole trunk of the intercoſtal nerve comes, and ſeems to be united to the wandring pair. But from the aforeſaid infolding, a noted branch being ſent forth, is carried towards the *Larynx*; which when it is divided into three ſhoots, the firſt of them is ſtretched out into the Sphincter of the Throat; the ſecond being hid under the Scutiform or Shield-like Cartilage, diſtributes its ſhoots to the upper Muſcles of the *Larynx*, and to the Muſcles by which the chink of the *Larnyx* is ſhut up; and the third alſo entring the Shield-like Cartilage, meets the top of the returning nerve, and is united to the ſame. Such an inoculating of this nerve, with the returning nerve, is conſtantly found in man and in all other perfect Animals; the reaſon of which is delivered anon.

Below the aforeſaid infolding of the wandring pair, its ſtem, near the ſide of the aſcending Caroditick Artery, goes forward ſtraight downwards, and in its journey imparts ſome ſmall ſhoots to the ſame, which ſometimes compaſs about the trunk of its Veſſel, ſometimes are inſerted into its Coats. In the lower par of the Neck this trunk of the wandring pair admits a branch of the intercoſtal nerve from its neighbouring infolding, and in the left ſide about that place ſends forth another nerve from it ſelf into the returning nerve, which croſs branch, being ſtretched out only in the left ſide, is found in man and all brute beaſts: but from thence the trunk of the wandring pair deſcends without any noted branchings till it comes over againſt the firſt or ſecond Rib; where another infolding being made, many ſhoots and numerous fibres are ſent forth towards the Heart and its Appendix. But this divarication of the Cardiack nerves is not after the ſame manner altogether in either.

For in the left ſide one or two noted ſhoots being ſent forth, together with the other ſhoots ariſing from the intercoſtal Nerve, are inſerted into the Cardiack infolding; but many fibres going out at the ſame place, are diſtributed to the Veſſels hanging to the Heart, and to its little Ears and *Pericardium*. In the right ſide a noted ſhoot going into the greater *Cardiack* infolding, another into the leſs, and two other ſhoots from the middle infolding of the intercoſtal Trunk towards the Cardiack infolding, aſſociate themſelves and are united. Beſides, numerous Fibres in like manner deſcend into the Veſſels of the Heart and the *Pericardium*. Alſo the returning Nerve in this ſide ariſing higher, is turned back about the axillary Artery, when in the left ſide the ſame going away much lower than this infolding from the Trunk of the wandring pair, compaſſes about the deſcending Trunk of the Aorta, and from thence it is turned back upwards.

The

The returning Nerve, although it ſeems a branch ſent forth from the Trunk of the wandring pair, being indeed a diſtinct and ſingular nerve, comes even from the beginning of wandring pair; yet for better conducts ſake it is contained under the ſame Coat with the reſt of the Trunk of the wandring pair. In either ſide about the knots of reflection or turning back, it ſends forth ſhoots and fibres which are diſtributed into the Veſſels of the Heart. The reflected Nerve in its aſcent receives in the left ſide a branch from the middle infolding of the Intercoſtal, and another from the wandring pair; but either running back, diſtributes many ſhoots to the rough Artery; then its extremity meeting with the ſhoot, which is ſent out of the Ganglioform infolding of the wandring pair, is united to it.

A little below the coming away of the returning Nerve on the left ſide from the Trunk of the wandring pair, another noted branch is ſent forth on both ſides; which being carried towards the Heart, covering its Baſis in the hinder Region, meets it on both ſides, and diſperſes in all its proceſs branches through the whole Superficies of the Heart. As ſhoots go from theſe branches into the hinder part of the Heart, ſo many branches and ſhoots go from the Cardiack infoldings which are divaricated into its fore-part.

But there are two infoldings from which the Nerves are diſtributed into the Heart. The upper and greater is between the *Aorta* and the Pneumonick Artery. The nerves conſtituting this are one or two noted branches that deſcend hither from either ſide the Trunk of the wandring pair; but chiefly many nerves form either intercoſtal nerve, to wit, from the midſt of its infolding. From this infolding two or three noted nerves are carried under the Aorta into the left ſide of the Heart. But from this infolding a ſhoot being ſent forth, making as it were an handle, compaſſes about the pneumonick Artery; and a branch deſcending from the right Trunk of the wandring pair to the exterior part of this handle, and another, which being carried from the nerve which is deſtinated to the hinder region of the Heart, meet together and make the leſſer infolding; from which nerves are ſent into the right ſide of the fore-part of the Heart.

We are to take notice, That in brute Animals many more and far greater Nerves are carried from the Trunk of the wandring pair into the Heart and its Appendix than in Man, to wit, in whom the chief Cardiack nerves or belonging to the Heart proceed from the intercoſtal pair, as is ſhewed below; wherefore in Brutes, for that reaſon, the wandring pair affords greater ſupplies or ſubſidies to the Heart, becauſe the intercoſtal nerve ſcarcely contributes any to it. Further, through the whole tract of the wandring pair, from whence the Cardiack nerves proceed, very many ſmall ſhoots, being ſent forth on both ſides, are inſerted into the *Oeſophagus* and the Glandula's implanted without the *Pericardium*.

From the Region of the Heart, the Trunk of the wandring pair ſends forth many noted ſhoots on both ſides, which being carried into the Lungs, are diſtributed, together with the blood-carrying Veſſes, through their whole ſubſtance, and in their paſſage ſtep by ſtep they follow the Pipes of the *Bronchia*, both the Arteries and the Veins, and many ſhoots being ſent forth on every ſide, they climb upon and compaſs about theſe Veſſels; then the Trunk of the ſame wandring pair, deſcending on both ſides, nigh the ſides of the *Trachea*, diſtributes many ſhoots alſo into the Coats of the *Oeſophagus*.

Below the Pneumonick branches, either Trunk of the wandring pair going forwards downwards nigh the ſides of the *Oeſophagus*, is divided into two branches, *viz.* into the exterior or more outward, and the interior or more inward. Both the inward branches inclining towards one another mutually, do again grow into the ſame Nerve, which being ſent ſtraight down towards the *Oeſophagus*, and being carried nigh the inward part of its Orifice, is bent back from thence, and creeps through its upper part. From both branchs, being carried nigh the oppoſite parts of the ſuperior Orifice, many ſhoots are produced, which being mutually inoculated, do conſtitute the nerves infolding like a little net. The Stomachical lower branch ſends forth very many fibres and ſhoots nigh the left part of the bottom of the Ventricle, which are united with others, ſent forth from the Meſenterick and Splenetick infolding. Further, in the right part of the ſame bottom of the Ventricle, ſhoots being ſent forth from either Stomachical branch, are united with other ſhoots ſent upwards from the Hepatick infolding; and about this place either Trunk of the Nerves of the eighth pair ſeems to be terminated, for that the laſt that may be perceived of it are ſome ſhoots ſent forth from the Stomachical branches, which are inoculated or ingraffed with the little branches or fibres ſent upwards from the Meſenterick infoldings.

CHAP. XXIV.

The Actions and Uſes of the Nerver of the eighth Pair, deſcribed in the foregoing Chapter, are unfolded.

AFter this manner the beginning and branchings out of the Nerves of the eighth pair are diſpoſed in Man: and they are almoſt after the ſame manner in Brutes, unleſs the Cardiack branches be more, becauſe in theſe they go out only from this one Conjugation. The Figure or Type of all theſe is well deſigned or drawn in the ninth Table or Figure, It now remains, recollecting the Tracts of this Deſcritption, or at leaſt the things chiefly to be noted, that we inquire into the Reaſons of their *Phænomena* or Appearances.

This Nerve, preſently after its riſe, appears with numerous Fibres, as may be diſcerned in the ninth Figure *E*: the reaſon of which is, becauſe many nerves here ariſing together, and deriving plenty of animal Spirits from the ſame ſtock or proviſion, ought to carry the ſame to divers parts, and remote one from another; and therefore they aſſume their *Latex* or Juyce, not at one Trunk, as the blood carrying Veſſels, and afterwards diſtribute it equally by branches and ſhoots here and there ſtretched out; becauſe the Spirits, derived from the ſame Fountain, have need to flow into theſe parts ſeparate from them, and variouſly to tranſpoſe and change their influence: wherefore for this buſineſs it is required (that we may not ſuppoſe little doors in the middle of the branchings out of the nerves, as are in the Pipes of a muſical Organ) that the nerves, which are deſtinated for the performing of divers offices reſpectively in diſtinct parts, ſhould be ſingle in their whole paſſage, and of themſelves diſtinct chanels of Spirits; for the ſake of a better conduct many of them are collected together, and ſeem to grow together into one Trunk; but they are parted both in their beginning, and alſo in their whole journey, and diſtinguiſhed, though involved in the ſame Coat, and ſo are carried to the reſpective parts. Otherwiſe how ſhould it come to paſs, that the Spirits to be carried for the performing the inſtinct of motion towards the Stomach, do not enter at the ſame time the Lungs or *Præcordia*, and actuate them with an inordinate influence? For indeed the ſhoots of the nerves of the wandring pair may be followed by the eyes and hand backwards towards the beginning, from the parts into which they are inſerted, and where they ſeem to be united into the ſame Trunks ſo ſeparated with the finger, that it may appear they are ſingle. After the ſame manner we have plainly ſeparated one from another the returning nerve alſo, and others, their common Coat being diſſected. Yet in the mean time we deny not, that in their progreſs they do communicate one with another by Fibres meeting mutually, if it be granted, that the ſame, although they ariſe together, in their very riſe it ſelf are in a manner diſtinct. For by reaſon of the nearneſs of the beginning and progreſs, though all the nerves of the wandring pair have a certain Sympathy and conſent in their actions; yet for that they conſiſt of parted ſtrings, they perform their actions ſucceſſively, and convey the influences of the Spirits to theſe parts ſeparate from thoſe.

We have already ſhewn, that the Nerve of the wandring pair, and others belonging to its family, do ſerve almoſt only to the involuntary Function. Wherefore it may be thought, that as there are many ſhoots and fibres, which going out diſtinctly from the ſame origine, are carried to divers parts, that indeed thoſe Bowels and Members, into which theſe nerves are inſerted, do perform their particular actions, ſtirred up either by the inſtinct of Nature, or by the force of the Paſſions, the Animal in the mean time ſcarce knowing it: yea alſo, that when certain other nerves, ariſing afar off, are joyned to this Trunk of the wandring pair, and communicate with it near the very origine of it; this ſeems to be therefore done, that thoſe nerves, an affinity with the wandring pair being begun, may be drawn into Sympathy with it, and into an unity of action of the involuntary Function. This appears clearly by the acceſſory nerve from the Back-bone, and ſome others, as ſhall be manifeſted anon.

In the mean time, we ſhall obſerve concerning the Fibres of the wandring pair, firſt that a noted ſhoot, inclining towards the vocal proceſs of the ſeventh pair, is united with the ſame, as in the ninth Figure *e*. Hence a reaſon may be taken, wherefore in every violent Paſſion, as of Anger, Fear, Joy, and the like, without the will or intention of the Animal, the Tongue ſends forth a voice, as an index of the excited affection; ſo that not only men, but ſome brute beaſts, in their fleeing or rejoycing, wail, cry out, and make a noiſe.

Secondly, from the beginning of the wandring pair very many Fibres are diſtributed into the Muſcles of the Neck, Figure the ninth *FFF*. in which there ſeems little need of the ſtirring up of ſpontaneous motions in that part; for to this task the Vertebral nerves ſerve ſufficiently. Notwithſtanding the aforeſaid Fibres of the wandring pair are the cauſe why the Neck is moved about in fear, or at any noiſe or ſuſpicion of danger; and alſo, why in ſome Animals, from indignation or pride, the Muſcles into which theſe nerves are inſerted, being inflated very much, their necks ſwell up, and the Creſts of many are erected. Of how great uſe the acceſſory nerve, coming from the Spine to the wandring pair, is for the pathetick motions of the Arms, ſhall be ſhewed preſently.

Thirdly,

Thirdly, The other Fibres of the wandring pair, being gathered together, ſeem to grow together into the ſame Trunk, which preſently conſtitutes the Ganglio form infolding from a ſhoot coming from the intercoſtal nerve, as in Figure the ninth *G. H.* And indeed it is very likely, that of theſe Fibres, which are complicated together in the Trunk of the wandring pair, one is deſtinated to the returning nerve, another to the *Præcordia*, a third to the Lungs, and laſtly, another to the Ventricle; all which, although they have communication among themſelves, and for the ſake of a better conduct are gathered together in one, yet they are ſtill diſtinct from their very original, and conſtitute divers paſſages of the animal Spirits.

But that a ſhoot is carried from the intercoſtal Nerve into the upper infolding of the wandring pair, as in the ninth Figure *b*; the reaſon is, that between theſe nerves a certain ſtrict affinity and kindred might be, and that either of them might be affected with the others offices. For as the nerve of the wandring pair diſtributes ſhoots chiefly to the *Præcordia*, and the Stomach, and the intercoſtal Nerve to the reſt of the *Viſcera* of the lower Belly; we may obſerve, that between all theſe there are not only ſome commerces, but Sympathies, and a conſent of Actions and Paſſions; wherefore there is a neceſſity, that the nerves deſigned to either parts, ſhould communicate among themſelves. Further, in Man the intercoſtal nerve imparts to the Heart and its Appendix more ſhoots and fibres than the nerve of the wandring pair: wherefore theſe nerves, do not only communicate by theſe ſuperiour infoldings, but alſo again a little lower by a ſhoot ſent out from the cervical infolding, or that of the Neck.

From the aforeſaid infolding a noted branch of the wandring pair is ſent forth into the Muſcles of the *Larynx*, a certain branch of which, entring the Shield-like Cartilage, meets with the returning nerve, and is united to it *Fig. 9. b.* It will not be difficult to collect what the uſe of this nerve may be; for ſeeing the *Larynx* or the rough Artery ſerves both for the drawing in and putting out of the breath, and alſo for the modulating the voice; for either office that its Trunk, like the folds in a pair of Bellows, may become ſometimes more ſhort, ſometimes more at length, theſe ſame ringy Cartilages ought to be pulled together, or contracted ſometimes upward, and ſometimes downward. That a flat voice or ſound might be formed, they ought to be preſt down as much as may be to the bottom; but if you would form a more ſhrill or ſharp ſound or voice, the ſuperiour Rings are lifted up; to wit, that the ſound might be broken but only in the very paſſage of the Jaws. For the performing of this double motion of the *Larynx* two nerves are conſtituted like the hands of a Piper, one of which ſtops the lower holes, the other the upper of the Pipe: to wit, the ſhoots and branches of the returning nerve being lifted up from below, move the ringy Cartilages downwards; and the nerve ſent out from above from this infolding, preſently draws the more ſuperior upwards. Further, becauſe a certain conſent and joynt action is required in both nerves, therefore they are mutually inoculated or ingraffed: yea, whenas either of them returning, diſtributes frequent ſhoots into either ſide of the *Trachea*; it ſeems that thoſe that are ſent out into the right part, move its Rings downwards for Inſpiration and a ſtrong Voice; and the others, going out on both ſides into the left part, carry the Rings upward for Expiration and for an acute or ſharp Voice. Moreover, as the inſtinct for the motion of depreſſion or preſſing down is delivered from the knots of the recourſe or reflections; ſo the impreſſion, for the elation or lifting up of thoſe parts, is received from this nerve of the *Ganglioform* infolding.

A noted branch from the middle infolding of the intercoſtal Nerve is carried into the Trunk of the wandring pair, *Fig. 9. i.* For what end that is ſo, we have ſhewn already; to wit, that the commerces of the Spirits dwelling in both nerves, might be ſtrengthened: but it ſhould be noted, that it is only ſo in the left ſide where the Trunk of the wandring pair ſhews it ſelf ſingle for a long ſpace; but in the right ſide, where the returning nerve goes from it much higher, here the other nerve from the intercoſtal infolding is plainly wanting.

About the Region of the firſt or ſecond Rib, another noted infolding appears in the Trunk of the wandring pair, from which many ſhoots and fibres are ſent towards the Heart and its Appendix, *Fig. 9. k.* Further, in brute Animals, about this place, the intercoſtal nerve leaves the Trunk of the wandring pair. Without doubt, ſome animal Spirits go apart in this infolding, which are deſtinated to the anterior region of the Heart, alſo to the *Pericardium* and ſome of its Veſſels, whilſt other Spirits paſs through, which a little lower are derived into the hinder region of the Heart; and which being yet carried further, go to the Lungs, and laſtly to the Ventricle.

We may obſerve, that from the aforeſaid infolding of the wandring pair numerous ſhoots and fibres are ſent forth, which are diſtributed into the little ears of the Heart and all the ſanguiferous Veſſels belonging to the Heart, *Fig. 9. l. m.* which fibres and nervous ſhoots creeping along like Ivy, thickly cover over the Coats of the Veſſels, and enter them in very many places, and variouſly bind them about. Truly this copious diſtribution of the nerves doth effect the pulſifick force in the little ears of the Heart and in the Arteries, or at leaſt ſeems to excite it; and ſo to erect and ſtrengthen thoſe parts by a continual influx of the animal Spirits through theſe nerves, that they may be able to ſuſtain an undiſcontinued reciprocation of *Syſtole* and *Diaſtole*. Moreover, that the thick fibres and ſhoots of the nerves are inſerted both into the Veins and Arteries, and bind both thoſe kind of Veſſels, and variouſly compaſs them about, we may lawfully ſuppoſe, that theſe nerves, as it were Reins put upon theſe blood-carrying Veſſels, do ſometimes dilate, and ſometimes bind them hard together for the determining the motion of the Blood according

according to the various force of the Paſſions, or to deduce it here and there after a manifold manner; for by this means it comes to paſs, that in fear the excurſion of the blood is hindred, and in other Affections its motion is reſpectively altered.

But that many ſhoots and branches are inſerted into the *Pericardium*, it ſeems to be for this uſe; to wit, that that little Cheſt which is made like a Fort for the defending the Heart from injuries, as often as any troubleſom matter aſſaults or beſieges it, might be able to draw it ſelf together, and to ſhake off the enemy. For it ſeems, that the inordinate tremblings and ſhakings of the Heart, which are manifeſtly different from its natural Pulſe, proceed from the violent ſhaking of this Membrane.

As to the Cardiack branches ſent from this infolding, we obſerve, that they, becauſe deſtinated to a publick office, do therefore communicate and enter into the pairs of either ſide before they are inſerted into the Heart; for which end the infolding is made before the Baſis of the Heart, where the aforeſaid ſhoots from the wandring pair and many others, going out from either intercoſtal nerve, meet together. From that infolding, placed betweem the *Aorta* and the pneumonick Artery, very many branches being ſent forth above, cover over the Hemiſphere of the Heart: but yet from theſe certain branches, carried under the *Aorta*, are brought into the left ſide of the ſaid Hemiſphere; and as other pairs tend towards the right ſide, one of the firſt of them, making a little handle, binds about the pneumonick Artery; then meeting with other Cardiack ſhoots, makes the leſſer infolding, out of which branches are ſent forth into the right and anterior ſide of the Heart. That from the greater Cardiack infolding, nerves departing one from another, do inſtitute contrary journies towards the Heart, it is indeed, that they might come to divers regions of the Heart without meeting one another, and might affect its Veſſels reſpectively in their paſſage; to wit, the branches carried this way, inſert their ſhoots into the *Aorta*, and from the others going that way, one compaſſes about the pneumonick Artery. The reaſon of both ſeems to be, that the blood might be either ſooner or ſlower drawn from the boſoms of the Heart for its various need or neceſſity. For whilſt the aforeſaid nerves do both ſuſtain its motion by their influx, and alſo moderate and temper it by their inſtinct, it ſo comes to paſs from thence, that thoſe Veſſels alſo, being affected by the ſame nerves, do further compoſe themſelves to the requiſite Analogies and proportions of the Pulſes.

Indeed there are many Nerves, and thoſe conſpicuous enough, which are inſerted into the Heart, and cover its outward ſubſtance with ſhoots ſent forth from all ſides; yet it is not to be thought, that theſe nerves alone perform and ſuſtain the undiſcontinued motion of the Heart: becauſe ſo ſmall little ropes ſeem too unequal for the perpetual agitation of ſuch a Machine. Yea it may be obſerved, that more ſhoots and fibres of nerves are diſtributed into the little ears of the Heart and the depending Veſſels, than into its frame or ſubſtance. Further, it is obvious to any that will behold it, that there is a greater plenty of nerves deſtinated to the Lungs, Liver, Spleen, Ventricle, or Reins, than to the Heart it ſelf; ſo that ſome Anatomiſts (a *Fallopius* ſays) were doubtful, whether there were any nerves that belonged to the Heart or not. But this being clear enough, that we may deſcribe the motive power of this Clock or Machine ſtirred up by the help of ſome ſmall nerves, as it were an exploſive motion, we ſay that the ſubſtance of the Heart it ſelf conſiſts of a very fibrous fleſh, and may rather be called a Muſcle than *Parenchyma* or congealed ſubſtance: wherefore in this, as in other Muſcles, the implanted and proper fibres cauſe the local motion and conſtant ſhaking; but by the inſerted nerves is only conveyed the inſtinct of the motion or action; for the performing of which office, both fewer Nerves and fewer animal Spirits flowing in through their paſſages, do ſuffice. But indeed we ſuppoſe, that the animal Spirits implanted in the Heart, and abiding within its Fibres, did at firſt flow thither through the nerves, and that by this way their expences or loſs are made up or ſupplied; yet that the animal Spirits, which ſeem to be diſpenſed to the Heart by ſo ſparing an hand, may ſuffice for the actuating this perpetual motion, they receive continually ſubſidiary Forces from the arterious blood. For elſewhere we have ſhewed, that in the Heart, as in the whole muſculous ſtock beſides, a ſulphureous Copula, from the ſuggeſted blood, is joyned to the ſpirituous ſaline Particles of the implanted Spirits; which matter, whilſt the Spirits are agitated, being at length ſtruck off, and as it were exploded (juſt like the rarified and in kindled Particles of Gun-powder) for the effecting the motive endeavour, do blow up or intumifie the Muſcle or the Heart it ſelf; and ſo from the indiſcontinued action of the Heart much of this ſulphureous Copula, which is eaſily ſupplied from the blood, and leſs of the Spirits, which are brought by the paſſage of the nerves, is beſtowed.

And here it may be rightly inquired into, whether the Pulſe of the Heart ſo neceſſarily depends on the influenc of the animal Spirits through the Nerves, that it being hindred, the action of the Heart ſhould wholly ceaſe? For the deciſion of this, we once made a tryal of the following Experiment upon a living Dog. The skin about the Throat being cut long-ways, and the Trunk of both the wandring pair being ſeparated apart, we made a very ſtrict Ligature; which being done, the Dog was preſently ſilent, and ſeemed ſtunned, and ſuffered about the Hypochondria convulſive motions, with a great trembling of the Heart. But this affection quickly ceaſing, afterwards he lay without any ſtrength or lively aſpect, as if dying, ſlow and impotent to any motion, and vomiting up any food that was given him: nevertheleſs his life as yet continued, neither was it preſently extinguiſhed after thoſe nerves were wholly cut aſcunder; but this Animal lived for many days, and ſo long, till through long faſting, his ſtrength and ſpirits being worn out, he died. The carcaſs being opened, the blood within the Ventricles of the Heart, and the Veſſels on every ſide reaching from thence, to wit, both the Veins and Arteries,

teries, being greatly coagulated, was gathered into clotters; to wit, for this cauſe, becauſe the blood, though for the ſuſtaining of life, it was in ſome meaſure circulated, yet for the moſt part it ſtagnated both in the Heart, and in the Veſſels. The cauſe of which ſtagnation I can aſſign to no other thing, than that the *Præcordia*, the influence of the animal Spirits being hindred, wanted its uſual motions.

If it ſhould be further demanded, from whence the animal Spirits (the paſſage of both the wandring pair being ſhut up) ſhould be ſupplied to the Heart continuing ſtill its motion; I ſay, that this may be done by the returning Nerves, as from the knots of which many Cardiack ſhoots and fibres proceed; and beſides, the end of either nerve meeting with the nerve ſent from the upper infolding, is united. But we ſhewed already, that the animal Spirits may be carried either this way or that way within the paſſages of the nerves; wherefore when the neceſſity of life urges, the proviſion of the Spirits, though leſſer, being ſent from the aforeſaid infolding, is received by the tail of the returning nerve, and from thence by a retrograde paſſage it was derived into the Cardiack branches, and at length into the Heart it ſelf. Further, there lyes open alſo another paſſage, and that perhaps more obvious, through the paſſage of the intercoſtal nerve: by this way in a man, as well as by the paſſage of the wandring pair, the Spirits are conveyed from the Brain to the *Præcordia*; yea alſo in Brutes a branch is carried into the Trunk of the wandring pair from the intercoſtal infolding; ſo that by this by-path ſome little rills of the animal Spirits (if by chance their influence ſhould be hindred through their wonted chanels) might be carried to the Heart. However that Experiment ſeems to conclude, that the motion of the Heart depends no leſs upon the inflowing of the blood, than upon that of the animal Spirit: the total privation of either takes away life; and Eclipſe of the Spirits wholly takes away from the Heart its motive power; and by the defect of the blood (foraſmuch as the ſulphureous Copula is denied to the Spirit implanted in the Heart) the vigour and elaſtick force of the Heart is ſuppreſt, ſo that the Pulſe being by degrees weakened, life is by little and little extinguiſhed. Without doubt, in the finding out the tenour of the Pulſe, we ought always to mind what the alteration of the animal Spirits, and what the fault of the blood may bring to it.

There is yet another conſideration concerning the Nerves reaching from the Trunk of the wandring pair to the Heart, to wit, that by their paſſage, not only the ſolemn influence and ſtate of the Spirits, for the equally performing of the vital Function, is conveyed; but alſo the inſtinct of every irregular motion, ſtirred up in the *Præcordia* by the force of the Paſſions, is in ſome meaſure transferred this way. I ſay, as to theſe, we ought to diſcourſe and to ſhew by what means, as often as the impreſſion of any Affection exerciſes the Imagination, or rather the Appetite, preſently the *Præcordia* are diſturbed by the paſſage of the Nerves, and by reaſon of their various Affections the motion of the blood is diverſly altered. But becauſe in a man the irregular and extraordinary motions of the *Præcordia* depend on the intercoſtal Nerve as much as and perhaps more than on the wandring pair; therefore we think good to defer this Speculation till the Theory of that Nerve is propoſed. In the mean time, we will proceed to the other branches of the wandring pair; and what next follows, we will inquire into the offices and uſes of the returning Nerves.

The returning Nerve in the left ſide, going away from the wandring pair below the aforeſaid infolding, and ſent towards the *Aorta*, is reflected or turned back about its deſcending Trunk, from whence being carried upwards, it imparts ſhoots to the Muſcles of the *Trachea* and the *Larynx* ſent forth by a long tract from either ſide of the Nerve; then its top or height is united with a ſhoot meeting it out of the Ganglioform infolding, *Fig. 9. n.* **** *b* But the returning Nerve on the right ſide is reflected much higher about the axillary Artery, to wit, proceeding from the lower infolding of the wandring pair, and after the ſame manner is beſtowed on the other ſide of the *Trachea*, *Fig. 9. L.* But either returning back about the knots of reflection, ſends forth towards the Heart very many ſhoots and fibres, which are inſerted into its little ears, the appending Veſſels or its Infoldings.

What the chief uſe of this Nerve is, we have already ſhewn; to wit, being rolled about on both ſides the Artery, as it were a Windlace, it cauſes the little rings of the *Trachea* or Weaſand to be drawn hither and thither, like the folds of a pair of Bellows, both for breathing and making a ſound. But indeed either Nerve, foraſmuch as it being reflected about the Artery, is carried upward into the part to be moved, doth move downwards the little rings of the *Trachea* or Wind-pipe by certain ſhoots of it; alſo foraſmuch as either is terminated in the Nerve, ſent from the Ganglioform infolding, it carries upwards the folds of the *Trachea* by other ſhoots of it. Hence a reaſon may be given, why the returning Nerves being cut off, every Animal is preſently dumb; to wit, becauſe, unleſs the *Trachea* be moved, the breath being blown out, paſſing without any refraction through its cavity, as it were through a Pipe alike hollow in its whole paſſage, gives no ſound.

Concerning theſe Nerves we ought to inquire, what is the reaſon of the difference, that the knots of reflection are not alike on both ſides; alſo for what end the Cardiack branckes proceed from both knots. As to the firſt, that the left returning Nerve, not as its pair, binds about the axillary Artery, ſome reaſon ſeems to be, becauſe the left axillary Artery, ariſing below, is carried as the right, by a bending, and not a ſtraight paſſage, into the Arm; wherefore the little cord of the Nerve, compaſſing about its Trunk, hath no fixed, but a very moveable knot of reflection, for that it might eaſily ſlide from its place. But it may rather be ſaid, that it is for other uſes, and thoſe more neceſſary, that theſe Nerves com-

paſs

paſs about thoſe Veſſels after that manner. For when they, as it were Reins or Bridles caſt on the blood-carrying Veſſels, by pulling them hither and thither, variouſly determine the courſe of the blood, it ſeems to be required, that one returning Nerve ſhould bind together or conſtringe the axillary Artery, and the other the deſcending Trunk of the *Aorta:* for as often as there is need for the blood to flow forwards towards the Head more plentifully, the returning Nerves perform it eaſily, by pulling upwards the aforeſaid Arteries: but the blood, after a ſort, ought to be continually urged into the higher parts, leſt otherwiſe by its weight it ſhould turn too much downwards; wherefore in all Expiration or breathing forth, when the *Trachea* drawing nearer together its folds, is contracted upwards, the blood about to deſcend the *Aorta*, is ſnatched upwards by one tract of the nervous little cord, and in like manner, the axillary Artery in the right ſide being ſhaken with it, the blood flowing in the whole aſcending Trunk of the *Aorta*, is driven upwards a little ſwifter.

But beſides this continual and equal ſnatching up of the blood towards the upper parts, it is ſometimes occaſionally urged towards the Head by a more intenſe and quick motion of the *Trachea*, and alſo by a more full and ſwift courſe. For as often as any Animal grows angry, the voice preſently ſhews ſigns of ſuch an Affection, and oftentimes by chiding, they make it ſharp; as men, when they are angry, chide or brawl, and Dogs bark: Now from ſuch an intenſion of the voice and chiding, as the upper rings of the *Trachea*, a reciprocation being there made, are often ſtruck together; ſo the blood alſo (the *Aorta* being ſtrongly drawn) is urged upwards by a copious afflux, ſo that it preſently dyes the countenance and eyes of angry people with a redneſs, and induces to the Brain it ſelf a greater heat and provocatives to anger, and a greater glowing or infiring to the Spirits by ſtirring them up. For the ſame reaſon, in Joy and Gladneſs, foraſmuch as the *Trachea* is exerciſed by ſinging or laughing, the blood alſo is poured out more plentifully towards the exterior, and eſpecially the upper parts.

And from hence the cauſe is plain, wherefore either returning Nerve ſends forth Cardiack branches from the knot of reflection or turning back; to wit, that in thoſe kind of affections, the notice of which the *Trachea* in ſounds or voices gives by the help of the Nerves, the Heart it ſelf by its means alſo might be affected, For ſo, as often as we wrangle or brawl, the Heart being irritated, preſently inkindles the blood more, and drives it forward more plentifully, as food for thoſe Affections, towards the Brain. Alſo in laughter, great rejoycing, or ſinging, by the paſſage of thoſe Nerves, the Heart being brought into a conſent or Sympathy, or joynt action, preſently explodes or drives out the blood by a ſwifter pulſe, and caſts it haſtily out, which otherwiſe would be heavy and troubleſom by a ſlower motion or ſtagnation; wherefore thoſe ſorts of actions, to wit, laughing and ſinging, are ſaid to alleviate the Heart, becauſe they make the blood more freely and readily to be poured out of the boſoms of the Heart, and alſo by the ſupplying help of the Lungs, to be emptied into the ſame.

Below the production of the left returning Nerve another noted Nerve is carried towards the hindermoſt region of the Heart, which being carried with a certain compaſs about its Baſis, ſends forth frequent ſhoots, which cover the left ſide of the hinder Hemiſphere, *Fig. 9. o.* Then this branch meeting with another pair ſent from the oppoſite ſide towards the Heart, and diſtributing ſhoots into the right ſide of the hinder Hemiſphere, is united with it, *Fig. 9. q.*

This Cardiack branch, deſtinated to the hinder region of the Heart, is produced apart below the reſt, that it might be carried by it ſelf to its Providence without the meeting with or implication of others; the pairs are ingraffed on either ſide, that they might accompany one another, and be together drawn in the ſame action of the Heart. It appears not plain, whether theſe nerves conſpire with the other Cardiack nerves, ariſing above, reaching forth to the anterior Hemiſphere of the Heart; or whether this pair effect not the *Syſtole* of the Heart, and the upper its *Diaſtole*. However it is, certain ſhoots of the kindred or ſtock of either, being ingraffed with others of another ſtock, communicate one with the other.

The Trunk of the wandring pair ſends forth on both ſides very many noted branches from the region of the Heart, which are ſpread on either ſide into all the Lobes of the Lungs, the *Bronchia* of the *Trachia*, and the Coat of the *Oeſophagus* hard by deſcending, *Fig. 9. s.s.s.* Thoſe which go into the Lungs paſs every where through their whole ſubſtance, following the ramifications of the Veins and Arteries, and the Pipes of the *Bronchia*, which chanels of blood and air they variouſly climb over, and bind about through their whole tract.

When that ſo many noted branchings of the Nerves are beſtoweed on the Lungs, it is a wonder, that by ſome they ſhould be thought to be inſenſible and immoveable of themſelves. Yea it is doubted by many, whether theſe Bowels do cauſe the motions of the *Syſtole* and *Diaſtole* of themſelves by their own endeavour. For that it is a received Opinion, That this reciprocation of the Lungs doth proceed wholly from the motion of the *Thorax*, and doth obey or obſerve its dilatation or conſtriction with a certain neceſſary dependency; *viz.* that the Breaſt being dilated or ſpread open after the manner of a pair of Bellows doth compel the ambient Air into the *Trachea*, which ruſhing into the Lungs, blows up and diſtends them; then the ſame Breaſt ſubſiding or ſinking of it ſelf, that the Lungs being preſſed together with the weight of it, do breath forth the Air before intruded. In truth, however that I might judge, that the *Diaphragma* and the Muſcles of the Breaſt do conduce much to Reſpiration; yet that theſe parts ſhould perform this office alone, and that the Lungs are merely paſſive, I cannot grant. For Reſpiration is chiefly inſtituted for the ſake of the blood and the Heart, and its act is wont to be determined according to the various diſpoſition of theſe, and to be altered every

every minute of an hour almoſt according to the manifold neceſſity of the Pulſe. But indeed the Lungs themſelves are they (and not the *Diaphragma* or the Muſcles of the *Thorax*) which the blood, boiling out of the Heart, paſſes through, and continually affects according to its temper, and the tenour of the Pulſe: wherefore from hence it may be concluded, That the Lungs themſelves do conceive the firſt inſtincts of their motions, and by the help of the aforeſaid Nerves, do in ſome meaſure exerciſe themſelves, and endeavour the *Syſtole* and *Diaſtole*, and deſign them according to the ſenſe of its proper neceſſity; but when in theſe, Fibres requiſite for local motion are wanting, therefore the *Diaphragma* and the Muſcles of the *Thorax* help continually the endeavours of the Lungs, and by the cooperation of theſe, compleat breathing is effected. And ſo when Nerves of a twofold kind, to wit, ſome from the Spine being inſerted into the Muſcles of the *Diaphragma* and the *Thorax*, and others from the wandring pair diſtributed into the Lungs, actuate the Organs of Reſpiration; for that reaſon it comes to paſs, that the act it ſelf of Reſpiration, of it ſelf unforced and involuntary, may be at our pleaſure ſomewhat reſtrained, interrupted, and diverſly altered. The *Sympraxis* or joynt action of the Nerves of either kind, in the work of Reſpiration ſhall be ſhewed hereafter, when we ſhall ſpeak particularly of the Nerve of the *Diaphragma*.

It yet appears more plain, that the Lungs are oftentimes the chief in the act of Reſpiration, becauſe they being irritated from ſtrange and improportionate objects, preſently conceive irregular and violent motions; as when a vehement Cough is ſtirred up for the exclution of any troubleſom thing; to which motion the *Diaphragma* and the Muſcles of the *Thorax* preſently obey. In like manner, in difficult and ſighing breathing, or any other ways unequal, its firſt inſtinct for the moſt part is begun by the Lungs; yet ſometimes when the exterior Organs of Reſpiration are excited into irregular motions, the Lungs alſo are compelled to follow their irregularities; ſo when the *Diaphragma* after a manner begins laughter, the Lungs perform the ſame with a following cackling ſound: ſo all the Organs of Reſpiration intimately conſpire and agree among themſelves, that although one of them do a thing inordinately, rather than there ſhall be a Schiſm, the reſt do imitate or follow its irregularity.

But that the Nerves, following the Arteries and Veins through the whole frame of the Lungs, do variouſly bind about and cloath their Trunks with a thick ſeries of ſhoots, the reaſon ſeems to be, both that the Coats of the Veſſels being gifted with a conſtant influx of animal Spirits, might inmitate the motion of the Heart; and by that means, by a continual pulſation of the Arteries and the conſtriction of the Veins, they might eaſily carry the blood in this its more ſhort luſtration through the Lungs; and the rather, that the pneumonick Veſſels, being bound about with ſuch Reins of Nerves, might moderate the courſe of the blood according to the forces and inſtincts of the Paſſions. For whenas the exterior circulation of the blood depends upon this interior; as the blood is commanded to paſs ſooner or ſlower through the Lungs, or to ſtay there and be hindred, the excurſion and return of it alſo from, or towards the Heart is wholly performed. In Joy or Anger, becauſe the Lungs rapidly tranſfer the blood out of one boſom of the Heart to the other; therefore its ſwifter and more plentiful flowing out into the outward parts, follows. In like manner, in Fear and Sadneſs, for that the Lungs (its Veſſels being ſtrained together) deliver the blood to the Heart by the Veins, and do not then preſently carry it back by the Arteries, the outmoſt region of the Body is deſtitute of its due influx Notwithſtanding theſe kind of pathetick ſnatches of the blood are in ſome meaſure performed, becauſe its Veſſels are bound about in other places in like manner with the Nerves. If at any time Spaſmodick Affections ſhould affect the pneumonick Nerves from a morbific cauſe, ſo that being twitcht with inordinate motions, they ſhould pull or draw together here and there the Arteries and Veins which they embrace; for that cauſe, the blood either too much flowing out of the Lungs, makes them to flag, and to fall together into themſelves, ſo that drawing to them copiouſly the Air, they do not eaſily render it back again; or, which frequently happens, the blood being detained within the Lungs, and there ſtagnating, ſtuffs them up, and holds them a long while ſtiff, that they cannot inſpire or draw in the Air. The Symptoms of either kind ordinarily happen in the Hyſterick diſtempers, and in ſome Hypochondriacal. Yea ſometimes the *Bronchia* themſelves are pulled together by the like Convulſion of the Nerves, and are hindred in their motion, ſo that they cannot take in and ſend forth the Air after its due manner, as may be ſeen in Aſthmatical Fits. The diſtempers of which ſort are oftentimes produced by the fault of the Nerves, without any implanted Dyſcraſie or evil diſpoſition of the Lungs. I have ſometimes obſerved ſome Caſes of ſick people, in which, when at one time the morbifick matter beſieging the Brain, had induced Lethargick or Vertiginous Symptoms, a little after the ſame matter occupying or poſſeſſing the origines or middle proceſſes of the nerves belonging to the Lungs, has ſuddenly excited a moſt horrid Aſthma without any previous Cough or Catarh.

But that out of the ſame tract of the wandring pair many ſhoots are diſtributed into the Lungs and alſo many others into the Coats of the *Oeſophagus*; from hence a reaſon may be given, why a troubleſom Cough oftentimes cauſes Vomiting and a ſubverſion of the Ventricle; why alſo on the other ſide a perturbation of the Ventricle ſo frequently induces a troubleſom endeavour of Coughing. I have known in Hypochondriacks, that aliments of ill digeſtion, taken into the Stomach, have preſently excited a vain and very pertinacious Cough; in the mean time, that the Lungs were free from any conſumptive diſpoſition. The cauſe of either diſtemper ſeems to be, that when the nerves, diſſeminated in either part, are taken with a Convulſion, oftentimes thoſe which are of the other part, are drawn into a conſent of the ſame diſtem-

per. Perhaps from hence it happens, that ſometimes an Aſthma is induced by reaſon of the evil of the Ventricle, and that that diſtemper (as *Riverius* obſerves) is often wont to be cured by an emetick Medicine.

After ſo many branches and ſhoots have been ſent from both ſides the wandring pair, at length its Trunk is divided below the Lungs into two branches, *viz.* the exterior and interior; either of which inclining towards the pair of branches on the other ſide, are united to them, and after a mutual communication they conſtitute the two Stomachical branches, *viz.* the ſuperior and the inferior, *Fig.9.t.u.w.x.*

It is worth obſerving, with what wonderful artifice either Trunk of the wandring pair do communicate one with the other with two branches, as it were two hands meeting one the other, that the influence of either nerve might equally reach to every region and part of the Stomach. For when as either Stomachical branch, to wit, both the upper and the lower, is carried together from the two branches coming out from either ſide of the wandring pair; it is provided, that the Tributes of the Spirits deſtinated to the Ventricle, ſhould be at once certain and very plentiful. For what appertains to the performing the action of this Bowel or Chylification, the Spirits flowing in from either ſide, are abundantly diſtributed into the Oriſice, and from thence into all its parts and private places; and by that means it comes to paſs, that the Stomach diſſolves bodies beyond the force of any Chymical Menſtruum. Then beſides, as to the feeling or ſenſe of the Ventricle, or the affection of it from things ingeſted; it is carried alſo towards the Head by a double way (whereby the paſſage may be the more certain) to wit, by either Trunk of the wandring pair; that for that reaſon being endued with a moſt exquiſite ſenſe, it might not be deceived concerning its objects; and if that any thing inimical or contrary to it, ſhould lye hid among what is eaten, it might diſcern it and thruſt it out of its own accord, or at leaſt by the knowledge only of the Cerebel.

That from the ſame double Trunk of the wandring pair, from whence the Cardiack Nerves ariſe a little above, the Stomachical branches alſo proceed, the cauſe is plain, wherefore the Heart it hath ſuch a Sympathy with the Stomach, ſo that its *Deliquium* or Swooning follows upon any great pulling or hawling of this.

Either Nerve of the wandring pair is terminated in the Ventricle it ſelf: for after the eighth Conjugation hath made as it were an high road for the paſſage of the animal Spirits to the *Præcordia* and to this noble Bowel, it puts a bound to it ſelf; nor indeed does it ſeem meet to have its branches ſtretched out any further to the *Viſcera* of the lower Belly: becauſe it ſeems an unworthy thing, that the ſame path which leads to the chief office of nutrition and to the Palaces of life it ſelf, ſhould lye open to the more vile Inteſtines alſo, and the ſink of the whole Body. And truly, although the ample path and broad way of the wandring pair is not produced beyond the Ventricle; yet becauſe a frequent commerce happens between this and the *Præcordia* and the other inferior parts; therefore between the Stomach and the other Bowels, though of a more baſe uſe, certain Fibres, as it were ſmaller paths, are reached forth, in which, at leaſt little bands of Spirits, like Diſcoverers or Meſſengers, run to and fro.

CHAP. XXV.

A Deſcription of the Intercoſtal Nerve.

After the unfolding of the Nerve reaching forth to the *Præcordia* and the Ventricle, we are led by the ſeries or order of the inward parts to the deſcribing a Nerve a kin to this, and which reaches forth its branches to the furthermoſt Province, to wit, to all the *Viſcera* or Inwards of the lower Belly contained below the Ventricle. This is commonly called the Intercoſtal, becauſe that going near the roots of the Ribs, it receives in every one of their Interſtices a branch from the ſpinal Marrow. Its beginning is not yet ſufficiently detected; for by moſt Anatomiſts it is wrongfully taken for a branch of the wandring pair, though indeed the wandring and the intercoſtal pair do communicate among themſelves by branches ſent forth one to the other; yet as to both their beginnings, Trunks and wandrings up and down, they are plainly diſtinguiſhed. If that this latter Conjugation, being denied the title of a peculiar nerve, ought to confeſs it ſelf of another ſtock, certainly it owes nothing to the wandring pair, but ſhould borrow its original from the Nerves of the fifth and ſixth pairs; for two or three ſhoots being ſent back from thoſe nerves going out towards the Eyes and Face, go into the ſame ſtock or Trunk, which is the Trunk of the intercoſtal nerve, as we have intimated before.

The intercoſtal Nerve being conſtituted after that manner, and going out of the Skull at a proper hole, preſently contains the Ganglioform infolding, Near to another the like infolding of the wandring pair; into which two nervous Proceſſes are carried from the laſt pair within the Skull, or the firſt Vertebral. From that infolding one ſhoot is ſent forth into the Sphincter of the Throat, and another noted one into the Ganglioform infolding of the wandring pair. Then this nerve deſcending towards the *Vertebræ*,

Vertebræ, hath in the middle of the Neck another far greater infolding, into which an ample nerve, from the neighbouring Vertebral pair, is inſerted; but from the ſame many nerves, which reſpect the *Præcordia*, are diſtributed on every ſide: For two or three ſhoots are ſent forth into the nerve of the *Diaphragma*, and one ſhoot into the returning nerve; beſides numerous fibres and ſhoots are carried both into the returning nerve, and towards the *Tracheæ*, which are inſerted into its Coats, and into thoſe of the *Oeſophagus*, and into the blood-carrying Veſſels. Further, one branch deſcends into the Trunk of the wandring pair, and two noted nerves into the Cardiack infolding; then a little lower another nerve by it ſelf, proceeding out of the intercoſtal Trunk, is inſerted alſo into the Cardiack infolding: which noted branches ſent down on both ſides from the intercoſtal nerve, for that they joyn together with others derived from either Trunk of the wandring pair, make the Cardiack infolding it ſelf. But theſe Cardiack branches from the intercoſtal nerve, as alſo the Cervical infolding, or that in the hinder part of the Neck, whence they proceed, are peculiar to men, and are wholly wanting in brute beaſts.

The intercoſtal Trunk deſcends from the cervical infolding towards the chanel-bone, where being about to enter the cavity of the Breaſt, it falls upon the axillary Artery, as it were in right Angles, and ſtrains or binds it; from whence it is drowned or hidden in the *Thorax* near the roots of the firſt and ſecond Ribs; and there receiving three or four branches from the Vertebral nerves next to thoſe uppermoſt, conſtitutes another infolding, which is commonly called the Intercoſtal infolding. The uppermoſt of theſe Vertebral nerves coming to this infolding in its journey binds the Vertebral Artery, and almoſt compaſſes it about. In Brutes by this nerve which comes upon the Vertebral Artery, the intercoſtal infolding communicates with the root of the nerve of the *Diaphragma*, and not by any other means, unleſs by ſmall fibres ſent forth from the lower part of the infolding into the Vertebral nerves. Further, in Brutes a noted branch is carried from this infolding into the Trunk of the wandring pair. But in Man the intercoſtal Trunk paſſes through the cavity of the *Thorax* without any communication had with the other parts; unleſs that from hence in its whole deſcent, running near the roots of the Ribs, it admits in every one of their interſpaces and from thence even to the *Os ſacrum* from between the knots of the *Vertebræ*, a Vertebral branch.

The intercoſtal pair ſends forth a noted branch on either ſide, where having gone through the cavity of the *Thorax* or Breaſt, it comes over againſt the bottom of the Ventricle, which tending towards the *Meſentery*, conſtitutes the chief infoldings of it. But there are ſeven Meſenterick infoldings, *viz.* five great ſuperior, and two leſs inferior: out of all which, numerous ſhoots and fibres are ſent forth together into the parts which they reſpect, and into the neighbouring infoldings. The Meſenterick nerves, which are carried into theſe infoldings, and the infoldings themſelves, and alſo the fibres and ſhoots, which flow out from them on every ſide, like rays of light, are diſpoſed according to the following manner both in Man and in the more perfect Brutes.

The Meſenterick branch therefore in the left ſide going from the intercoſtal Nerve, and bending downwards, is parted into two noted ſhoots: the greater of theſe bending back upwards towards the Stomach, diffuſeth it ſelf preſently into an infolding, as a narrow rivulet into a ſpacious Pool. From this infolding numerous fibres and ſhoots go forth as it were in four bands. The firſt of theſe, and which is the greateſt bundle of its fibres, being carried into the Ventricle, is beſtowed partly in the bottom of it, and partly theſe fibres are met, and ingraffed with others ſent from the Stomachical branch. The other maniple or band of nervous Fibres goes forth from this infolding to the Spleen, where the nerves accompanying the ſanguiferous Veſſels, and variouſly binding them about, are diſperſed into the more inward frame or ſubſtance of the Spleen; yet out of which going towards the Spleen, ſome ſhoots following the ſhort Veſſels are carried into the Stomach. The third Company of nervous Fibres is inſerted between this infolding, and the Hepatick or that belonging to the Liver, placed in the right ſide over againſt it. Laſtly, the fourth Conjugation of Fibres knits together this and the greateſt infolding of the Meſentery lying under it.

The lower ſhoot of the Meſenterick branch, which is on the left ſide, increaſes into an infolding, to which the next Vertebral branch, deſtinated to the intercoſtal Nerve, is carried. From this infolding the chief bundle of the nervous Fibres is carried into the left Kidney, and before the Fibres enter the Reins, they bind and variouſly compaſs about the emulgent Veſſels. Further, between this infolding and the greateſt of the Meſentery many Fibres are ſtretched out; from hence alſo many ſhoots are diſtributed into the atrabilary Cheſt, or the Receptacle of the Spleens excrements.

In the right ſide the Meſenterick branch being ſent from the intercoſtal Trunk, and being in like manner twofold, contains in its upper ſhoot the Hepatick infolding; out of which the greateſt bundle of nervous Fibres is carried towards the Liver; numerous ſhoots of which accompanying the blood-carrying Veſſels, greatly beſet, and as it were cloath with a little net the Trunk of the Hepatick Artery: which Fibres and ſhoots, being carried higher, are diſtributed into the Liver, Gall cheſt or bag, the paſſage of the Gall, the Pylorus, and the Pancreas. Further, many Fibres, which are of this Conjugation, meet with Fibres ſent from either Stomachical nerve, and are ingraffed into them. Another hand of nervous Fibres is ſtretched out between this infolding and the oppoſite infolding to the Spleen, and another between this and the greateſt infolding of the Meſentery; yea, there is ſome communication had between this and that belonging to the Kidney lying under the ſame ſide by a large ſhoot ſent down.

The lower ſhoot of the right Meſenterick branch, like as it is in the oppoſite ſide, contains a ſufficiently noted infolding nigh the atrabilary Cheſt; to which preſently the intercoſtal Nerve imparts its Vertebral branch received below. From this infolding the chief bundle of nervous Fibres deſtinated to the Reins, embraces the blood-carrying Veſſels in like manner as in the oppoſite ſide; alſo many fibres and ſhoots are ſtretched out from this infolding to thoſe near, *viz.* the Hepatick and the greateſt of the Meſentery; yea, certain Fibres are diſperſed from the ſame into the atrabilary Cheſt.

After this manner either Meſenterick branch being carried from the intercoſtal pair, and being preſently twofold, immediately conſtitutes two infoldings in either ſide. In the midſt of theſe the infolding of all ſtands like the Sun in the midſt of the Planets; from which numerous ſhoots and fibres are diſperſed into all the parts of the Meſentery; which indeed following the blood-carrying Veſſels in their whole proceſs, climb over and bind about the ſame. Moreover, between this infolding and every one of the four aforeſaid is produced a peculiar little bundle of Fibres. Beſides, in the female Sex, from hence ſome ſhoots are carried into the Glandula's of the Womb, commonly called the Stones. But from the Meſenterick branches, which conſtitute the former infoldings, no noted branches, but only little ſhoots, are ſent into this infolding. Yea the chief Nerve which is inſerted to this, and ſeems to be the primary for the coveying of plenty of Spirits into it, and a broad way, is carried from a certain ſmall infolding far lower nigh the ſtraight Inteſtine; which infolding, together with the other neighbouring one, that we call the leſſer infoldings of the Meſentery, ſhall be deſcribed preſently. In the mean time, that we may proceed to them in order, we will follow the paſſage of the intercoſtal Nerve.

Below the Meſenterick branches, from which the aforeſaid ſuperior infoldings are conſtituted, the intercoſtal Trunk deſcends between the Muſcles of the Loyns, and beſtows every Vertebral branch, admitted in its deſcent, upon ſome internal parts.

For the Vertebral branch brought to the intercoſtal Trunk nigh both Kidneys, is carried into the Womens Teſticles, then ſome following into the Ureters. From the Region of the twenty ſeventh *Vertabra* one Vertebral branch and two others, going from the intercoſtal Trunk, tends towards the ſtrait Inteſtine, and there they meet with three pair ſent from the other ſide; all which being united, conſtitute the infolding, which is the loweſt of the Abdomen. From this infolding a noted Nerve, being carried upwards, is brought into the greateſt infolding of the Meſentery, which in its journey receives one and then another ſhoot ſent down on both ſides from the intercoſtal Nerve; and there, near its bounds, diſtributes ſome ſhoots into the Glandula's of the Womb.

But from the loweſt aforeſaidin folding, a Nerve going towards the upper Infoldings, about the ſpace of an inch, conſtitutes another leſſer infolding in the neighbourhood; out of which one Nerve tends upwards, and another oppoſite ſtraight downwards. The former of them is carried into the greateſt infolding of the Meſentery, and in its whole paſſage ſtretches under the ſtraight Inteſtine, and part of the *Colon*, and inſerts into them many ſmall ſhoots. But the other Nerve deſcending from this infolding towards the *Anus* under the inferior part of the ſtraight Inteſtine, imparts to it alſo frequent ſhoots; ſo that this infolding, the leaſt of all thoſe which are within the Abdomen, ſeems to be conſtituted for the ſake of this Nerve only, to wit, which lying under the ſtraight Inteſtine and part of the *Colon*, is inſerted into the greateſt infolding of the Meſentery.

From the loweſt neighbouring Infolding, to which this leaſt owes its original, two Nerves going out, and being ſent down into the *Pelvis*, cauſe there two infoldings, *viz.* one in either ſide, in which the Nerves coming from the *Os ſacrum*, and ingraffed with the former, meet; from which alſo the Nerves diſtributed into the abjacent parts, ſerve unto the ſeveral Excretions, *viz.* of the Urine, Dung, and Seed made in that place: for two Nerves enter into the end of the ſtraight Inteſtine, and as many into the Womb or Proſtates; but one and that noted one, is carried into the Bladder.

But that we may return to the Intercoſtal pair, after either Trunk of it had ſent forth three branches, out of which the aforeſaid lower infoldings of the *Abdomen* are mediately or immediately made, it deſcends ſtraight towards the *Os ſacrum*, and in its journey ſends forth yet one or two branches into the Ureters: but as ſoon as it is come to the beginning of the *Os ſacrum*, both nerves mutually inclining themſelves to one another, are demerged within the bending of the ſame bone, and there nigh its declining, and then in its deſcent, they ſeem to be knit together upon it by two or three proceſſes; and ſo at length either nerve ends in very ſmall fibres, which are diſtributed into the Sphincter of the *Anus*. But ſometimes either nerve joyn together into a round infolding nigh one tranſverſe proceſs, out of which ſingle infolding the like very ſmall Fibres are produced. Further, many others from the laſt Vertebral Nerve meet with, and are ingraffed with theſe Fibres from the intercoſtal pair inſerted into the *Anus*.

CHAP.

CHAP. XXVI.

The Explication of the Intercoſtal Pair of Nerves which are deſcribed in the former Chapter as to their Offices and Uſes: and firſt the upper Branching of them is conſidered.

THE beginning of the Intercoſtal Nerve are two or three ſhoots reflected or turned back from the Nerves of the fifth and ſixth pair, and united into the ſame Trunk, *Fig. 9. D.a.a.b.* Here we may wonder at the birth of this Nerve, as it were borrowed; for it grows as a ſhrub upon another tree or ſhrub; and therefore diſpenſes the common virtues and influences of either with a double branching, *viz.* both its own and that of its parent: by which ramification or branching it comes to paſs, that there are very quick commerces and conſent between the conceptions of the Brain and the affections of the *Præcordia*, alſo between the Actions and Paſſions almoſt of all the parts of the whole Body, which belong to the involuntary Function. For in that the Trunk of the intercoſtal Nerve proceeds from the Nerves of the fifth and ſixth pair nigh their beginnings, that is a ſign that both the influence of the animal Spirits, and the inſtincts for the performing of motions, are derived chiefly into it from the Cerebel; to wit, from whoſe annular proceſs the aforeſaid pairs of Nerves ariſe. But foraſmuch as the ſame intercoſtal Nerve is rooted in their Trunks, and not immediately in the Cerebel; this is the reaſon why the Eyes, as alſo the parts of the Mouth and Face, to which the fifth and ſixth pairs have regard, do anſwer ſo readily and unknown to the Cerebel, as it were by the ſame act, to the motions of the *Præcordia* and *Viſcera*, which the intercoſtal Nerve effects; and on the contrary, the motions of theſe preſently follow the action of thoſe. As for example, in Sneezing as ſoon as the nervous Fibres beſmearing the Noſtrils, are wrinkled together by the pulling, preſently by the paſſage of the intercoſtal nerve the Diaphragma, by reaſon of a more deep inſpiration or drawing in the breath, is for ſome time depreſſed; then the Cramp of the Noſtrils remitting, the Midriff alſo being violently drawn back, cauſes a more ſtrong breathing forth with a vehement blowing of the Air. In like manner on the contrary, when by a tickling made upon the Ribs, the Diaphragma being affected with a Spaſm, moves to a cackling noiſe, the Face and Mouth are pathetically figured with it into laughter.

The intercoſtal Nerve being ſlid out of the Skull, preſently conſtitutes the Ganglioform infolding *Fig. 9. G.* it being after the ſame manner in the Trunk of the wandring pair. What the uſe of theſe infoldings is in general, we have already ſhewn; and clearly for the ſame reaſon in this place in the intercoſtal Trunk, where it receives into it ſelf ſome nerves from elſewhere, and ſends forth others from it ſelf into the neighbouring parts, this infolding, as it were a knot in the ſtem of a flouriſhing Tree, is made, that it may be as it were a diverting place for the manifold tendency of the Spirits. As to the adventitious Nerves it is obſerved, That by them plenty of ſubſidiary Spirits are tranſmitted hither, only from the ſpinal Marrow, but by a manifold and frequent paſſage; wherefore in this infolding, and again in the following, then a little lower, nigh the ſeveral junctures of the *Vertebræ*, the Vertebral branch comes to either Trunk of the intercoſtal pair: this ſeems to be ſo conſtituted for many uſes. Firſt, That the intercoſtal Nerve, by the reiterated faſtening to the ſolid parts, as it were by a frequent ſtay, might become the more firm for the making of a long journey, when otherwiſe its little rope, by too much ſtretching out, might be eaſily broken. Secondly, By this means it comes to paſs, that the nerves which are the Executors of the ſpontaneous, and thoſe of the involuntary Function, might have both a more certain commerce together, and might be ſometimes excited into mutual ſuccors. Hence Reſpiration and ſome other Acts, eſpecially what concerns the Act of *Venus*, participate of either Regiment, ſo that ſometimes they follow the will, and ſometimes draw it even by force or unwilling. Further, when at any time the ſtock of animal Spirits is deficient in either Province, ſupplies of them are ſought from the other: to wit, (as we hinted above) if the influence towards the *Præcordia* be ſhut up through the ordinary paſſages, *viz.* the internal nerves, their paſſages requiſite for the ſuſtaining of life, might be ſupplied by the Vertebral branches: yea it is probable in the partial *Apoplexie*, and in the *Incubus* or Night-mare, when the Cerebel being affected, the Spirits deſtinated for the Heart, ſuffer an Eclipſe in the Fountain it ſelf, that through theſe Emiſſaries, to wit, the Vertebral branches inſerted into the intercoſtal pair, ſome extemporary Subſides are carried for the actuating the Heart. Thirdly, The Vertebral branches by ſo frequent an inſertion, are added to the intercoſtal nerve, perchance in ſome reſpect for this end alſo, that the ſuperfluous or excrementitious humidities, heaped together about the ſpinal Marrow, might be ſent away by theſe Proceſſes: for indeed we have already ſhewn, that a certain humor doth abound within the Head, the medullar Appendix, and nervous Syſtem; which oftentimes (when it becomes watry, or abounds above meaſure) begets a ſerous heap in thoſe parts: wherefore when the branches of the intercoſtal nerve are terminated into the Meſentery, Kidneys, Inteſtines, and ſome Genital parts, it is probable they do tranſfer into theſe ſinks ſuperfluous humidites, not only their own, but alſo of another ſort, to wit, thoſe received from the ſpinal Nerves.

As

As to the Nerves, which as Emiſſaries, are carried from the aforeſaid Ganglioform intolding into other parts, we obſerve; firſt, that a noted ſhoot is carried from hence into the Sphincter of the Throat, *Fig.* 9. γ. This nerve in the Sphincter of the Throat correſponds with others akin, ariſing higher from the fifth pair, and diſtributed into the parts of the Palate and Mouth, and is helpful to them in the buſineſs of chewing: for when the maxillar branches of the fifth pair ſhould perform their work for the chewing of the food taken in, the task of this nerve mediately ariſing alſo from the fifth pair, follows to wit, whereby the Throat being opened, the chewed meats may be thruſt forward into its paſſage.

Another ſhoot is ſtretched out from this infolding into a like infolding of the wandring pair placed near, *Fig.* 9. α. The reaſon of this inſertion is delivered above, where we treat of the wandring Pair. But it may be obſerved further concerning this; when ſo nigh a communication happens between theſe infoldings, and when ſhoots are ſent from one of them into the Muſcles of the *Larynx*, and from another into the Muſcles of the Throat, from hence we may give a reaſon, why in Hyſterick diſtempers and in ſome Hypochondriacal, here is ſo frequent and familiar a Symptom of the ſenſe of choaking in the Throat. For a Cramp or Convulſion being begun in any Nerve, it is wont to creep forward further by the paſſage of the ſame, and ſo to invade ſometimes theſe parts, ſometimes thoſe ſucceſſively. If therefore at any time a Spaſm ariſes any where in any nerve of the wandring or intercoſtal pair, and from thence tending upwards or downwards, ſhall come to either infolding, preſently both being affected, and the Muſcles of the whole neighbourhood being contracted, a bulk or Tumor like a Globe or round thing in the Throat is excited with a ſenſe of choaking,

The intercoſtal Nerve deſcending a little lower, contains in the neck another greater infolding proper to man, to which a noted Vertebral nerve is inſerted alſo, out of which many nerves deſtinated to the *Præcordia*, are ſent forth on either ſide, *Fig.* 9. *T*. As to the principle parts, to wit, the Brain and Heart, there is no ſuch great difference between a Man and a Brute, as there is about the paſſage of one to the other, or the commerce that thoſe parts have mutually among themſelves. In either kind, for the exerciſe of the vital Function, the animal Spirits are derived from the Head, with a conſtant emanation into the Heart; to which ſort of influence of theirs the paſſage of the wandring pair of nerves ſeems ſufficient: wherefore in moſt Brutes the paſſage to the Heart and its Appendix lyes open only by this way, and ſcarce at all by any nerves of the intercoſtal pair. But in Man the intercoſtal nerve, beſides its offices in the lower Belly, common to him with other Animals, ſerves in the place of a ſpecial Internunicus alſo before the Cloiſter of the Breaſt, which bears the mutual ſenſes of the Brain and Heart this way and that way, or to and fro. For when, beſides the nerves of the wandring pair, ſtretched out alſo into the humane *Præcordia*, (which certainly ſeems ſufficient for the executing of the offices of the Function merely vital) ſo many noted branches are ſent forth from the aforeſaid intercoſtal infolding, what kind of office ſhould be attributed to theſe, unleſs that they ſhould contain the animal Spirits, by whoſe work and miniſtry, the mutual reſpects and affections of the Brain and Heart ſhould be communicated to one another? Whilſt I conſider this difference of either kind, it comes into my mind, that Brutes are like Machines framed with a more ſimple furniture and with leſs workmanſhip, and therefore furniſhed with a motion of one kind only, or determined for the doing ſtill the ſame thing. But in Man divers ſeries of motions, and as it were complications of wheels within wheels, appear. For indeed, by the paſſage of the aforeſaid infolding, the conceptions of the Brain preſently affect the Heart and its Veſſel, and cauſe the reſt of the Appendix, together with the Diaphragma, to be moved. Hence the motion of the blood and its inkindling in the Heart, together with the Pulſe and Reſpiration, are altered: and for that cauſe, from the Heart being altered, not only impreſſions are retorted upon the Brain by the paſſage of the ſame nerves, but alſo the blood it ſelf, its courſe being changed, drives to the Brain with a different or unaccuſtomed fluctuation, and ſo by moving the animal Spirits with various impulſes, cauſes firſt one ſort of conceptions, and then others to be produced: and ſo by reaſon of theſe reciprocal affections of the Heart and Brain, which are wont by a long ſeries to be propagated viciſſively, a multiplicity of thoughts and Phantaſms ariſes. Hence both the ancient Divines and Philoſophers placed wiſdom in the Heart. Certainly the Works of Prudence and Vertue depend very much on the mutual commerce which happens to the Heart with the Brain: becauſe, that cogitations about the acts of the Appetite or Judgment may be rightly deſcribed, it is behoveful for the flood of the blood to be reſtrained in the Breaſt, and the inordinations of it and of the Heart it ſelf to be governed by the Nerves, as it were by Reins, and to be compoſed into requiſite and apt motions. We might ſay more concerning this, but that this Speculation is from our purpoſe, and belongs more properly to Pathology or the Doctrine of the Paſſions of the Soul, in the mean time, we may refer hither one or two Obſervations taken from *Anatomy*.

When of late we had diſſected the Carcaſs of a man that was a Fool from his birth, we could find no defect or fault in the Brain, unleſs that its ſubſtance or bulk was very ſmall. But the chief note of difference which we obſerved between the parts of this man and of a man of judgment, was this, That the aforeſaid infolding of the intercoſtal Nerve, which we call the *Internuncius* of the Brain and Heart, proper to man, was very ſmall in this Fool, and beſet with a weaker guard of Nerves,

Whilſt we were writing theſe, we made an Anatomy of a Monkey, whoſe Brain differed little from that which is ſeen in a Dog or a Fox, unleſs that it was much more capacious in the proportion to the bulk of his Body, and the turnings and windings of it were larger. The orbicular Prominences called

Nates

Nates and *Testes*, also the ringy Protuberance, sent down from the Cerebel, came nearer the figure and magnitude of those parts in a man. But what occurred chiefly worthy noting, was this, *viz.* That the intercostal Nerve, although even as it is wont to be in other Brutes, being included in the same sheath with the Trunk of the eighth pair, was carried through the Neck, yet departing from this Nerve near the Chanel-bone, before it was inserted into the infolding, placed nigh the roots of the upper Ribs, did send forth some shoots into the Heart and its Appendix, and certain Fibres into the nerve of the Diaphragma: which perhaps partly is the reason, why this Animal is so crafty and mimical above other Beasts, and can so aptly shew and imitate, not only the gestures, but the passions and some manners of a man. But we will proceed to the explication of the intercostal Nerve from whence we have digressed.

We have already intimated for what use the Vertebral branch is inserted into its cervical infolding. There is the same reason for this as for the other Vertebrals, which communicate with the intercostal Nerve almost in its whole passage. But for that the nerve of the *Diaphragma* is radicated in the same Vertebral nerve, from whence a branch comes into this infolding, I say from that a reason may be taken, why the motion of the *Diaphragma* intimately conspires with the *Præcordia*, yea and with the conceptions of the Brain: which kind of Sympathy of the *Diaphragma* with the other parts, because it is requisite to be more strict and noted in man, it is observed, That not only the Vertebral branch cometh between the infolding and the root of the nerve of the *Diaphragma*, but two and sometimes three nerves are sent from this infolding into the trunk it self of the nerve of the *Diaphragma*, *Fig.* 9. ε. ε. Truly from hence not only the joynt action or *Sympraxis* of the *Diaphragma* with the *Præcordia* may be derived; but also the genuine cause is here manifest, why Risibility is a proper Affection of a man. For as often as the Imagination is affected by any pleasant or wonderful conception, presently the Heart desires to rejoyce, and as it were by shaking off its load to be eased: wherefore that the blood might be more swiftly emptied out of its right bosom into the Lungs, and consequently out of the left into the *Aorta*, the *Diaphragma*, instigated by the passage of the nerves going out of this infolding, is drawn upward by a more rapid *Systole*, and raises up the Lungs, as it were making iterated leaps, and causes them, by their more frequent striking together, to drive out both the Air and the blood. Then forasmuch as the same intercostal Nerve, which communicates lower with the nerve of the *Diaphragma*, is continued also higher with the maxillary Nerves, a cackling being made in the Breast, with it the gesture of the Mouth and Face pathetically answers.

One or two noted shoots and many nervous Fibres are carried from this infolding into the returning Nerve, *Fig.* 9. ζ. Certainly the reason of this communication seems to be, that the *Diaphragma* and the Heart it self (into which nerves are sent from this infolding) might yet more conspire with the rough Artery (which the returning nerve affects) in its various actions, and especially in laughing, weeping, and singing. Moreover, when the returning Nerves, by pulling upwards the Trunks of the *Aorta*, cause the blood, for the stiring up some Affections, to creep more swiftly towards the Head, they may in the performing that office be much helped by the associate labour of the Nerves sent from this infolding.

From this infolding in the Neck many small fibres and shoots are spread into the sanguiferous Vessels, as also into the Coats of the *Trachea* and the *Oesophagus*, *Fig.* 9. *ibid.* As to what belongs to the former that respect the *Trachea* and the blood carrying Vessels; their office is, that they may respectively draw together and spread abroad those channels of inspired and expired blood and Air, according to the way and manner wherewith the Pulse and Breathing ought to be performed; whereby the motions of either might be the better retarded or accelerated, according to the necessities or requirings of the Heart. Then numerous Fibres are stretched out from this infolding into the Coats of the *Oesophagus* placed near, that by this means the admirable consent between the Heart and the Stomach, by reason of the Nerves being reached forth from this infolding and from the wandring pair to both, may be produced.

Concerning the Cardiack branches sent from this infolding, we need not discourse any more: after having but now intimated, that these were as it were *Internuncii* peculiar to men, which carrying to and fro the reciprocal impressions of the Brain and Heart, cause Commerces in both Kingdoms. But forasmuch as Nerves of a double kind, *viz.* of the wandring and intercostal pair, respect the humane *Præcordia*, lest the gestures of one should be different from those of the other, therefore the *Cardiack* branches, which are of either family, partly communicate in the same infolding, and are partly inoculated mutually by shoots sent forth before they are distributed into the Heart it self.

Below the Cervical infolding, the intercostal Trunk being demersed within the *Thorax*, admits three Vertebral Nerves arising higher, and constitutes the other infolding, which is commonly called the Intercostal, but more properly the *Thoracical* infolding, *Fig.* 9. Θ. In this place the intercostal Nerve being about to pass into its last and more large Province, *viz.* the *Viscera* of the lower Belly, and therefore seeking aid for the journey, and as it were a *Viaticum* for it self, it gets together in this infolding an increase or aiding forces from the Vertebral nerves, and afterwards receives lower others fresh nigh the several knots of the *Vertebræ*; because it will have need of a great stock of the Spirits, which it must bestow on the Mesenterick infoldings, and on other parts of the *Abdomen*.

That

That this Nerve about to enter the Thoracical infolding, doth bind the Chanel-bone Artery, *Fig. 9.l* and that the ſuperior branch of the Vertebral, being ſent into the ſame infolding, doth bind about the Vertebral Artery, *Fig. 9. π.* the reaſon of both ſeems, that the blood, for the uſes and neceſſities of the lower *Viſcera* (to which the intercoſtal Nerve from thence ſerves) may be driven forward with a more plentiful afflux downwards: which thing thoſe Nerves eaſily do by pulling together the blood-carrying Veſſels towards their infolding; ſo that they attempt this ſnatching of the blood in oppoſition to that which the returning Nerves perform. And indeed when the blood, tending upwards and downwards is wont ſometimes to flow too much towards either bound, ſometimes to be wanting; therefore the nerves, as it were an incitement or remora, are variouſly diſpoſed both in the upper and lower region of the Circuit about the ſanguiferous Veſſels. After what manner this Thoracical infolding is in brute Beaſts, ſhall be particularly ſhewn hereafter. The intercoſtal Nerve in a Man, both in this infolding and in the whole deſcent through the *Thorax*, receives many Vertebral nerves, as if ſparing of its own ſtock, and greedy of anothers, but ſends forth from it ſelf not a ſhoot: whatever of Spirits is remaining either from the influence above, or comes to it by the by, is reſerved wholly for a largeſs to be beſtowed on the *Viſcera* of the lower Belly. But after what manner, and by what paſſages of nerves that is diſpenſed into the ſeveral parts, we will unfold in the following Chapter.

CHAP. XXVII.

The lower Branching of the Intercoſtal Nerve belonging to the Parts and Viſcera *of the lower Belly is unfolded.*

AFter the intercoſtal Pair hath paſt through the hollowneſs of the *Thorax* without any expence of Spirits, unleſs in the Neck-infolding, at length it ſends down from the region of the Ventricle on both ſides, a noted Branch; either of which preſently becoming divided into two, conſtitute two peculiar Infoldings on either ſide; but one infolding ariſes in the midſt of them, as if common to either ſide. Of the infoldings which are on the left ſide, one reſpects the Kidney, and the other the Ventricle with the Spleen; but of thoſe which are on the oppoſite ſide, one reſpects the right Kidney, and the other the Liver and its neighbouring part. In the midſt of theſe, the infolding proper to the *Meſentery* and the biggeſt, is placed as the Sun among the other *Planets*. Further, from theſe are ſent forth one to another and into the neighbouring parts numerous Fibres very thickly, as it were dartings of rays. *Fig.* 11. plainly ſhews all theſe.

Concerning theſe, in the firſt place, it ſhall be inquired into in general, For what end ſo many nervous infoldings, with almoſt innumerable fibres and ſhoots, are diſtributed about the Meſentery and the *Viſcera* of the *Abdomen*. For when in theſe parts the fibres and nervous ſhoots are carried on every ſide with ſo thick a ſeries, that they are variouſly infolded with their manifold meeting, it may ſeem wonderful, if every one of theſe be deſtinated to ſome uſes, and are not rather ſprinkled here and there by chance, and as it were by the inconſiderate ſporting of Nature. And indeed any one can ſcarce think, that ſo many Veſſels ſhould be prepared for the performing the offices of motion or ſenſe in that place. For thoſe *Viſcera*, unleſs highly pulled and affected with a Convulſion, are ſenſible of little or nothing that we know of; and their motions are almoſt no other thing than obſcure Vermiculations or light Corrugations, ſo that for the effecting them there is required no greater preparation than for the ſlow progreſs of a Snail. Wherefore from hence it hath come into the mind of ſome, that a certain Juyce, and that perhaps nutritious, was diſpenſed by this manifold paſſage of the nervous Pipes: which ſort of office however if aſſigned to theſe Fibres diſperſed about the Meſentery, why ſhould not the ſame office either of receiving or of carrying of nouriſhment, be granted to thoſe in like manner divaricated about the Lungs and the *Præcordia*, and eſpecially about the rough *Artery*? But truly it is highly improbable, that a nutritious Juyce ſhould be contained in the Coats of the *Trachea* or of the *Bronchia*, which the nerves may ſuck out; nor does it more clearly appear, why more nerves ſhould be deſtinated for the carrying of the alible Juyce to theſe parts of the Abdomen, or thoſe of the Breaſt, than is needful for the muſculous ſtock. But in the mean time, though we deny, that the whole nutritious matter is carried this way and that way by thoſe or the other nerves; yet we think, that within thoſe nervous paſſages an humor doth perpetually abound, which may be for a Vehicle of the animal Spirits, and a Ferment for the nutritious matter: with which going with the nervous humor towards the Inteſtines and to the other ſinks of the Body, it is likely, that the ſuperfluous and excrementitious ſeroſities do often ſlide down together, and ſo are carried out.

But it may be well thought, as to the Meſenterick Nerves, and Infoldings in which they are terminated, and the Fibres moſt thickly going out of theſe, that theſe different manner of Veſſels are firſt Chanels, then Storehouſes, and laſtly the laſt Emiſſaries of the animal Spirits. If it ſhould be demanded, for what end ſo great plenty of Spirits ſhould be deſigned for theſe ignobler parts; I ſay, that this is done for the performing the acts of Motion and Senſe there, which are highly neceſſary for the preſerving of life it ſelf. For although local motion, which is always performed by the help of a Muſcle, as of a Spring, is not convenient for the *Viſcera* of the lower Belly; yet inteſtine motions are brought forth by them almoſt continually, and after many faſhions: *viz.* for the ſubduing the Chyle, alſo for the ſeparation of ſome parts and particles from others, both of that, and alſo of the bloody Liquor, and the protruſion of every one towards their deſigned bounds, the Fibres and nervous ſhoots reaching into the Membranes of the *Viſcera* and the Coats of the Veſſels, yea and into the textures of the *Parenchyma*, are variouſly drawn together, to wit, theſe are pulled upwards, thoſe downwards; ſometimes many together, ſometimes apart or ſucceſſively, are wont to be drawn hither and thither. In truth, it is a ſign of the indiſcontinued action of theſe *Viſcera*, that as well in ſleep, and perhaps more than in waking, the Culinary work of Nutrition is performed; and whilſt the Organs of the other Faculties are at reſt, there is no quiet granted to theſe: but that the Meſenterick nerves perpetually grinding in the Mill, are always buſied for the preparing the alible humor and the exporting the ſame towards all parts.

Moreover in theſe parts, to which the aforeſaid Nerves belong, there is found an exquiſite feeling no leſs than a motive Faculty; for whatſoever heterogeneous or hurtful thing, mixed with the Chyle or blood, is brought to any *Viſcera*, preſently the Spirits, inhabiting thoſe parts, being warned of the evil, do greatly tumultuate as it were by entring into a Conſpiracy, that what is hoſtile or troubleſom they might ſhut out. But indeed, becauſe the animal Spirits, flowing by the paſſage of the intercoſtal nerve to the Inteſtines and *Viſcera* akin to them, proceed from the Cerebel; therefore the buſineſſes of either Faculty, to wit, both the ſenſitive and locomotive, foraſmuch as they are performed the Brain unconſulted, and the animal ſcarce knowing it, are not ſo openly taken notice of, and for that reaſon they are accounted of leſs than the ſpontaneous acts of the other parts.

But as to the manner it ſelf or way of the œconomy, whereby the animal Spirits, deſtinated to the *Viſcera* of the lower Belly, are exerciſed, we affirm, That plenty of them flow into all the Meſenterick infoldings by the paſſage of the nerves ſent from the intercoſtal pair; where being heaped up to a fulneſs, as it were in ſo many Storehouſes or places of Receipt, they are kept to be diſtributed from thence into ſeveral parts, as occaſion requires. But that the Spirits flow out of theſe infoldings, not through ſingular and larger branches, (as is done in the Muſcles) but as it were by Troops of Fibres, into their proper tasks, the reaſon is, becauſe here the buſines is performed otherwiſe than in the muſculous ſtock. For where a Muſcle is fixed to the part to be moved, its implanted Fibres perform the whole work of Contraction, or of the motive endeavour; but it ſuffices for the nerve ſtill to convey new ſupplements of Spirits, and as occaſion ſerves, the Inſtincts of the Motion to be performed: but in the Membranes and the *Viſcera*, where Muſcles are wanting, the nervous Fibres themſelves moſt thickly implanted, and diſtributed as it were ſo many little ropes, almoſt into every part of the ſubject, perform the buſineſs of Traction or drawing by themſelves and their own proper endeavour or force partly; and partly ſolicite or ſtir up into motion the Fibres implanted in the *Viſcera* diſpoſed after an uncertain order; which they determinate in their action, and moderate or govern them, as it were ſo many fingers laid upon the ſtrings of a muſical Inſtrument. For although the Membranes and the *Viſcera* themſelves are indued with ſome implanted Fibres; yet theſe are not, as it is in the Muſcles, of one kind and poſition; but in the ſame part ſome are ſtraight, and others oblique or crooked, theſe tend upwards, thoſe downwards, and others are carried round; ſo that divers ſorts of motions ought to be performed in the ſame Membrane or Inward, ſometimes together, ſometimes ſucceſſively or by turns: wherefore diſtinct nerves are required, not only for the ſeveral ſeries of Fibres, but for all the parts of the ſubject, to wit, which may ſtop here a motion begun in that place, and may begin another anew, or may unite one with another. Truly the motion which is performed in the muſculous ſtock ſeems like the rude and more ſimple work of ſome Weaver, where the ſhuttle being always caſt after the ſame manner, the Woof is laid under the Thread or Yarn: but the motions of the Inteſtines and *Viſcera* may be aptly compared to a Texture very much variegated or flouriſhed, for the weaving of whoſe more artificial ſubſtance or making there is made uſe of many hands together, or of a Machine diverſly turning about, and furniſhed with more than a thouſand ſorts of motions.

Concerning the many Meſenterick Nerves, and Shoots, and nervous Fibres which go out of them by bands, we muſt conſider chiefly theſe two things: to wit, what may be the office of each of them for the ſtirring up of motion or ſenſe, either of them, or both together in any part: then ſecondly, what the communication of either of them may be with other nerves, infoldings or bundles of nerves, by reaſon of which a Sympathy or conſent of actions ariſes at once in divers parts. According to theſe two reſpects we will particularly weigh now the ſeveral nervous Veſſels belonging to the *Viſcera* of the lower Belly.

Therefore in the left ſide the ſupreme Meſenterick branch being preſently forked like the figure of the Letter Y, contains in its upper ſhoot the Stomachical infolding, which is alſo the Splenetick, and in the other lower the Renal infolding or that belonging to the Reins. Moreover, about

the knot of diviſion it ſends forth ſome ſhoots to the greateſt infolding of the Meſentery, *Fig.* 11. *F. G.* Hence a reaſon is plain, wherefore there happens ſuch affinity between the Ventricle and the Spleen, and between the Meſentery and the Reins, ſo that the very often and familiar Symptom of Vomiting is both in Splenetick, Colical, and Nephritick people: becauſe when a Convulſion is begun in any part or Inward, which the Meſenterick nerve reſpects, preſently other parts, to which the infoldings or ſhoots of the ſame nerve belong, are drawn into conſent.

From this lower infolding a little bundle of Nerves being carried towards the Stomach, inſerts its Fibres partly in its bottom, and partly ſends them to meet with other Fibres ſent down from the nerve of the Stomach, *Fig.* 11. *n.* The reaſon of the former is, That whereas there are many Coats of the Ventricle, and divers ſeries of Fibres are diſpoſed in them, for the actuating all of which with a due influx of animal Spirits, the Stomachical nerves, derived from the wandring pair, are not ſufficient; it was fit, that for the outward Court as it were or Precinct of this Inward, to wit, for the outmoſt bottom of it, ſome forces of Spirits might be ſupplied from ſome ſtrange Kingdom, to wit, from the aforeſaid nervous infolding of the Abdomen. Inſtead of this, Spirits alſo may ſlide downwards from the ſame Stomachical branch through other Fibres ſent down, and be ſent into this Splenetick infolding. Beſides alſo it is obſerved, That the adventitious nerves aptly conſpire with the former, being of the proper dominion of the Ventricle, and that either are not only inoculated within the confines of the Inward it ſelf, but they run into mutual embraces without it, and as it were joyn hands together.

It ſeems plain, that the nervous Filaments being carried from the aforeſaid infolding to the bottom of the Ventricle, may ſerve there for the performing the acts of Motion and Senſation: but it doth not ſo eaſily appear with what office the other handful of Fibres reaching out from hence into the Spleen is charged (*Fig.* 11. *ζ.*) becauſe this Inward is ſaid to be deſtitute wholly of every animal Faculty. When we did elſewhere inquire into the uſe of the Spleen, we thought good to affirm, That its office was to ſeparate the dregs of the Blood and the acid-ſaline Particles, and whatſoever were of a more fixed nature, and to concoct them more being received into its own boſom, and to convert them into an acid Ferment; by which being again delivered to the blood through the Veins, a ſharpneſs and an aſperity, as alſo an active or fermentative virtue are gotten for its *Latex*. Wherefore the whole ſubſtance of the Spleen conſiſts of a texture of Fibres in the form of a net; to wit, that the Feculencies of the blood migh be more plentifully received, and contained within its ſpongy cavities and thick paſſages. I ſay therefore, that for the fit preſerving and diſpenſing of the Splenetick Ferment, beſides the Arteries which carry matter, and the Veins which continually ſup back ſome portion of the ſame fermented, there ſeems to be need of many nerves alſo, which both by pulling the fibrous texture of the Spleen, might cauſe the melancholick and dark *Fæces*, laid up in it, to be ſhaken together, and ſo by defending it from putrefaction and coagulation, cauſe it to be imbued with an acid and fermentative nature; and alſo that thoſe nerves may ſometimes draw together and conſtrain the blood-carrying Veſſels, ſometimes open and inlarge them; that as occaſion ſerves, the Feculencies of the blood may be ſometimes more plentifully, ſometimes more ſparingly laid aſide out of the Arteries into the Spleen; alſo that more or leſs of the Ferment, preſerved in the Spleen, may be poured out on the blood according to the requirings of the Paſſions or of the natural Inſtinct. No Hypochondriack but doth abundantly perceive, that ſome Splenetick nerves do perform motions; for thoſe great perturbations which are wont to be excited in the left ſide, as when ſometimes Inflations, ſometimes conſtrictions of the inward parts, and ſometimes various concuſſions are perceived with a wandring pain running here and there, they are only Spaſms or Convulſions or wrinklings together, with which the nerves of the Spleen are ordinarily affected. Nor do its nerves, taken with a Convulſivon, ſtir up tumults only in the neighbourhood of the Spleen, but oftentimes further into the Heart it ſelf, yea into the whole Body the effects of their inordinations are carried. I have known an Hypochondriack, who preſently upon the Spleen being diſturbed, ſeemed to have his *Præcordia*, being drawn downwards, to be cruelly preſt and bound together; ſo that being very ſad and dejected in his mind, alſo complaining of an exceeding great ſtraitneſs and conſtriction of his Breaſt, he thought himſelf almoſt dead. The cauſe of which kind of diſtemper was without doubt, that when many Fibres going out of the Splenetick infolding are united with the other Fibres ſent from the fartheſt end of the wandring pair, it eaſily happens, that the former, being diſtempered with the Convulſion, do draw together and pull downwards their yoke-fellows, and by conſequence the Trunk it ſelf of the wandring pair, from which the nerves are ſent into the *Præcordia*: certainly by the *Sympraxis* or joynt action of either kind of the aforeſaid nerves, *viz.* whereof theſe reſpect the Spleen, thoſe the *Præcordia*, it is effected, that the Trembling Oppreſſion, and other grievous Diſtempers of the Heart, as alſo of the Spleen, ſo ordinarily happen. Further, foraſmuch as the Fermentation of the blood depends on the Spleen, according to the influence of this, that perform its Circulation, ſometimes pleaſantly, ſometimes diſturbedly. Whilſt the Spleen is at quiet, and free from any perturbation, the blood alſo is quietly moved in Hypochondriacal perſons; but if the ſame be moved and exerciſed, (as it is wont to be in any paſſion or violent motion of the Body, or by a Medicine) preſently its nerves being diſtempered with a Convulſion, ſhake it more with reiterated contractions; ſo that the fermentative Feculencies, being ſhaken out of its boſom, flow back more plentifully into the blood, which cauſe its *Latex* preſently to be troubled, and as it were muddy, and ſharpen it with ſo great acrimony and mordacity, that it burns and pricks the Brain and Heart like needles; from whence in Splenetick people beſides that the Reaſon is obſcured, the affections of the Mind, eſpecially Sadneſs, Hatred, and Anger are very much increaſed.

Concern-

Concerning the Splenetick Nerves, by another conjecture, we are yet brought to believe, that they, beſides the exerciſe of the motive Faculty, do both inſtil into the Spleen its own humor, which promotes the fermentative virtue of that Inward; and alſo (becauſe the nerves, as was ſhewn already, convey the Spirits, and ſometimes the humors by either way, *viz.* forward and backward) the ſame implanted in the Spleen, do often imbibe from it an acetous or Vinegar-like humor, and as it were Vitriolick, from whoſe acrimony and notable twitching, they are forced into Convulſions.

But foraſmuch as the nervous Infolding reſpecting the Spleen, communicates more nearly with the Ventricle, Meſentery, Liver, and Kidneys, and more remotely with the *Præcordia* and other parts placed at a diſtance; from hence the cauſe is plain, wherefore not only theſe ſeveral *Viſcera* and parts, by reaſon of the fault of the Spleen, are folded together; but alſo on the contrary, why the Spleen being indiſpoſed by any Diſeaſe, or trouble raiſed up in any of thoſe parts, is wont to be diſturbed: ſo it is not altogether for nothing, that the Symptoms every where infeſting, the cauſe of them being unknown, are aſcribed ordinarily to the Spleen; becauſe it fixes not only its own inordinations in other parts, but alſo ſuffers for their peculiar faults: which notwithſtanding is wrongfully aſcribed to Vapours tranſmitted from this or that part, when the formal reaſon of every Diſtemper of this kind for the moſt part conſiſts in the communication made through the Nerves.

The lower Infolding of the left ſide ſeems to be made for the Kidney placed near, into which chiefly the bundle of its Fibres is carried, *Fig.* 11. ϒ. γ. γ. Certainly that theſe nerves, following the emulgent Veſſels, do embrace the ſame, and bind them about with a various and frequent complication; that is ſo made for that end, that by reaſon of the Artery being ſo ſtrained and frequently ſhaken by the drawings of the nerves, the Serum may the more eaſily be precipitated from the blood: wherefore it is obſerved in very great difficulty or danger, when the mind and all the nerves are ſtrained for fear, that a frequent and more plentiful making of water, and that often painful, is wont to be provoked.

The Renal Infolding receives, beſides the Nerve common to it with the upper infolding, another new and peculiar one from the intercoſtal nerve, or rather that coming between from the ſpinal Marrow, *Fig.* 11. β. Hence it is, that the Loyns have a great conſent with the Reins, and ſuffer ſo ordinarily for their Diſtempers with a grievous and largely diffuſive pain. Foraſmuch as this infolding communicates with the greateſt of the Meſentery, the Colick diſtemper and the Nephritick are much akin, and it is often difficult to diſtinguiſh their fits one from the other.

The Meſenterick branch in the right ſide, as well as the left, being forked, contains two infoldings: the upper of theſe (which we call the Hepatick) ſends forth from it ſelf many little bundles of nervous Fibres; the greateſt of which being carried towards the Liver, cloaths the Hepatick Artery as it were with a Net made of Fibres, *Fig.* 11. δ. ο. The moſt Learned *Gliſſon* obſerves, That the Hepatick Artery is beſtowed on the Trunks of the Veſſels, to wit, of the common Cheſt, of the bilary Pore, and of the *Vena Porta*; for the watering of which, and for the actuating them with heat and nouriſhing Juyce, it carries the arterious Blood; to which notwithſtanding for the recarrying, an aſſociate Vein is wholly wanting: wherefore that ought to carry the blood, not with a full and free influx, but by little and little, and always in a conſtant meaſure to thoſe membranaceous parts: for otherwiſe there had been danger, leſt from the bloody *Latex* plentifully ruſhing forward, for that it could not be ſtill remanded preſently through the Veins, an Inflammation ſhould be excited, or leſt from its torrent being transfuſed beyond its bands, the courſes of the other rivers in the Liver ſhould be diſturbed. But for that the nerves, like Reins, do bind about the Trunk of the Artery, the inflowing of the blood it ſelf is moderated, and they cauſe it variouſly to be diſpenſed according to the wants of thoſe parts to which it is deſtinated.

From the Troop of Nerves going out towards the Liver, ſome bend down into the *Pancreas*, and others into the *Cholidock* Veſſels, *Duodenum*, and *Pylorus*, and ſow into them thick ſeries of ſhoots, *Fig.* 11. π. π. The office of theſe ſeems to be, to pull together the excretory paſſages of thoſe parts, and to ſhake them for the cauſing Evacuations of the boiling or turging humors upon occaſion. Further, from theſe Fibres being carried upwards, when many others ſent from either Stomachical nerve are united, the reaſon is plain, why from an hawling or pulling made about the Ventricle, the yellow Bile is drawn out of the Gall-cheſt into the *Duodenum*, which being carried from thence into the Ventricle, by reaſon of a Convulſion of that ſame Inteſtine, is caſt up by Vomit: becauſe the Stomachical nerves being irritated by a Medicine, or by any troubleſom thing, for the making an Evacuation above, and for that cauſe drawn from thence upwards, they draw together the nerves belonging to the Liver and the *Cholidock* Veſſels, for that they are tied to them, and bring them into conſent with the ſuperior Spaſm or Convulſion. Hence it happens, that not only the Stomach being firſt tired, draws to it ſelf the Bile by its Convulſion, and allures it into its own boſom; but the Bile alſo of its own accord growing turgid, and ſo being poured out into the *Duodenum*, foraſmuch as it irritates the nerves of this Inteſtine, and then by their conſent, provokes the nervous Veſſels of the Ventricle, it preſently induces a cholerick Vomiting.

The Hepatick Infolding communicates with the Splenetick by Fibres going between either, *Fig.* 11. θ. The reaſon of which ſeems to be, That when one infolding reſpects the end or the right extremity of the Ventricle, and another the left; that a conſent in either and a joynt action may be made towards the Stomach, both communicate between themſelves by nerves, as if *Internuntii*. Truly it ſeems to come to paſs by the paſſage of theſe nerves, that the *Hypochondriacal* pains oftentimes run from the left ſide

nto the right; to wit, for that a Spaſm or Convulſion begun in the Splenetick infolding, is wont to be carried to the Hepatick.

Between the *Hepatick* Infolding and the greateſt of the *Meſentery*, many Fibres reaching out by bands, are caſt out in the midſt, *Fig.* 11. *p.p.* the office of which is to ſuſtain a certain commerce and Sympathy, to wit, ſuch an one is required, both that the Chyle may be miniſtred from the Inteſtines towards the Liver ſtill in due proportion, alſo that the Bile may opportunely ſlide out from the Gall-bladder into the Inteſtines for the provoking of Excretion. For we are of this Opinion, That the Meſeraick Veins ſucking out a certain portion of the Chyle from the Inteſtines, immediately transfer it through the region of the Liver into the *Vena Cava*, whereby the blood in the aſcending Trunk of the hollow Vein or *Vena Cava*, might be freſhly imbued with nouriſhing Juyce; even as in its deſcending Trunk it is refreſhed, the ſame being poured out through the *Thoracical* Veſſels or thoſe belonging to the *Thorax*. Wherefore it is needful, that there ſhould be a very ſtrict affinity between theſe *Viſcera*; and the rather, becauſe the Bile ought to be poured out from the Gall cheſt to the Inteſtines, not continually, but for ſome uſes, by occaſions and intervals. For the Nerves knowing beſt the wants of either part, warn them both of their mutual duty, and as occaſion ſerves, ſtir them into action.

It is obſerved, That in the right ſide an ample Nerve is ſtretched out between the *Hepatick* and *Renal* infolding, *Fig.* 11. μ. So that between theſe infoldings a greater and more immediate conſent is had, than between thoſe pairs of the other ſide. The reaſon of which doth not eaſily appear, unleſs perhaps it ſhould be ſo made for this end, that when from the Reins, in making of water, there is an endeavour of the ſerous Excretion, the *Pylorus* and the *Cholidock* Veſſels being at once drawn downwards, a protruſion of the Chyle and *Fæces* might be provoked towards the lower parts of the Belly. Certainly this connexion of theſe infoldings is chiefly the cauſe, why oftentimes moſt cruel Vomiting uſes to come upon a Fit of the Stone; and that from ſuch a Vomiting the *Cholidock* Veſſels are very much emptied, as if provoked by taking an Emetick.

The greateſt Infolding of the Meſentery being placed in the midſt of the reſt, like the Sun, diſperſes every where round about nervous Fibres like rays, *Fig.* 11. ⊙. and caſts them not only on every one of thoſe infoldings, as if ſo many Planets with a peculiar Aſpect, or *Actinoboliſm* or Irradiation, but alſo it diſtributes them into many Inteſtines, ſanguiferous Veſſels, and other parts lying round about: without doubt upon theſe nervous Filaments, which are carried from this infolding to the Inteſtines, as Lines from the Centre to the Circumference, every action of the Inteſtines, and eſpecially the Periſtaltick motion of the Vermiculation, depends; namely for that theſe Fibres do move ſucceſſively, and ſtill move further every begun action, as it were with a ſpiral or Screw-like progreſs.

That from this Infolding many Fibres and ſhoots going forth, are inſerted into the Trunk of the *Aorta* nigh its deſcending, and that theſe reaching towards the Inteſtines, accompany the Blood-carrying Veſſels, and in ſeveral places climb over them; from hence it may be inferred, That nerves alſo in the Abdomen are like Bridles and Reins caſt on the ſanguiferous Veſſels, which either by ſtraining or pulling them together, may ſometimes retard, ſometimes incite the courſe of the blood according to the needs of the lower *Viſcera*.

From the greateſt Infolding of the *Meſentery* ſome noted Fibres and ſhoots are ſent out into the *Glandula*'s of the Womb or the Womens Teſticles, *Fig.* 11. *t.t.* Into which alſo other ſhoots from the Trunk of the intercoſtal Nerve, *ibid. v.v.* and others going out of the nerve which comes between this infolding and the loweſt of the Abdomen, do come together, *ibid.* ⏚. ⏚. So that a proviſion of Spirits is carried into thoſe parts from a threefold Store-houſe; which indeed is much larger than is done in the other Sex, when we find ſcarce any nerve to belong to mens Teſticles. Indeed the Womb, beſides that it is a very ſenſible part, ought alſo to be moved diverſly, and in bringing forth a child very ſtrongly: wherefore there are granted to this both more ſtrong implanted Fibres, and alſo Nerves of a various kind and original.

Moſt of the Infoldings of the Abdomen, but eſpecially the loweſt, and that related to it the greateſt of the Meſentery, are oftentimes affected in the Paſſions commonly called Hyſterical, as ſhall be preſently declared. Therefore if at any time ſuch diſtempers proceed from the Womb, the cauſe is manifeſt wherefore the aforeſaid infoldings are drawn into conſent. But we have elſewhere ſhewn, That thoſe Paſſions are merely convulſive, and not ſeldom excited without any fault in the Womb. Further, that Symptom very frequent in thoſe kind of Fits, to wit, in which as it were a Globe is perceived to be carried from the bottom of the Belly, and about the Navel to leap out impetuouſly, which therefore is thought to be an aſcent of the Womb; I ſay, that it is nothing elſe than moſt cruel Convulſions of theſe infoldings. Indeed oftentimes in Women, and ſometimes alſo in Men, I have known when the convulſive Affection hath invaded, that a bulk in the *Hypogaſtrium* hath been ſeen to ariſe, then about the midſt of the *Abdomen* ſo great a ſwelling to follow, that it could not be hindred or preſt down, though ſtrongly attempted by the hands of a ſtrong man. Without doubt, the cauſe of this admirable diſtemper is, that within the nerves of the intercoſtal pair the inflowing animal Spirits, as often as they beign diſorders or convulſive motions, firſt (as it is wont to be) begin to grow hot or to be exploded about the extremities of the nerve, to wit, in the loweſt infolding of the *Abdomen*; which affection of theirs, when creeping upwards it is carried to the greateſt infolding of the Meſentery, ſo that the Spirits inhabiting it are taken with the like inordination, it is no wonder, if that ſwelling up of the middle of the *Abdomen*, and as it were an exploſion of a certain nitroſulphureous matter, ſhould be ſtirred up. For truly it is not probable,

probable, that that Symptom ſhould be excited from the Womb aſcending and being removed from its place, becauſe, beſides this part being fixed in its place and firmly eſtabliſhed with Ligaments, the bulk of it alſo in Virgins is ſo ſmall, ſcarce exceeding the bigneſs of a Walnut, that although it ſhould be carried up into the Belly, it could not produce ſuch a ſwelling. Nor is it more likely, that this ſort of diſtemper is ſtirred up from the Muſcles of the *Abdomen* taken with a Convulſion: for they, however convulſive, draw together themſelves and ſubjected parts upwards or downwards, or of one ſide, but they are not able by any means to bear themſelves aloft, and to lift up on high, with a force, the region of the Navel. But, as we ſuppoſe, the animal Spirits in the greateſt infolding of the Meſentery growing fierce, and becoming apt to be exploded, (as ſuch indeed they are whenever they enter into convulſive motions) they being there gathered round thickly into a Globe, do mainly blow up and lift on high with their effervescency and notable rarefaction that infolding with its whole neighbourhood, and at once drive upward the *Viſcera* lying upon it with a certain vibration or ſhaking. A more full explication of this Symptom belongs to the Pathology of the brain and Nerves.

In the mean time we ſhall take notice, that another certain Diſtemper, *viz.* the *Colical* grief doth belong to the infoldings of the *Abdomen*, and eſpecially to this greateſt of the Meſentery. For it may be thought, that the moſt cruel torments that are wont to be excited in this diſeaſe do come, not from an excrementitious matter ſhut up in the cavities of the Inteſtines, nor always from a ſharp humor impacted in their Coats, but oftner from the nervous Juyce imbued with a certain acrimony, and ſtagnating within this infolding; from whence, by reaſon of a conſent of this with the infoldings both Hepatick and Splenetick, a frequent and cruel Vomiting comes upon theſe pains. But theſe *Pathologick* Speculations being referred to their places, we will follow what we firſt of all inſtituted, the further paſſage of the intercoſtal Nerve, by which we are led to the two leſſer and loweſt Infoldings of the *Abdomen*.

Below the Meſenterick Nerves, out of which the ſuperior Infoldings are made, either deſcending intercoſtal Trunk ſends forth three or four ſingular ſhoots, which are carried into the Ureters, *Fig.* 11. *v. v.* The uſe of theſe ſeems to be, to pull together, and to jog or ſhake thoſe urinary Chanels, that the Serum ſeparated in the Reins, may be the more readily drawn out towards the Bladder. Moreover, if at any time a viſcous or muddy matter doth ſtick to the paſſages of the Ureters, or a more fixed ſtone doth obſtruct their Cavities, they, by the help of the Nerves inſerted here and there in their whole tract, being pulled together and wrinkled, may preſs down and always move forward any bulk or ſubſtance ſtaying in the paſſage.

Nigh the *Vertebræ*, out of which the Crural Nerves begin to go forward, three diſtinct branches brought to either intercoſtal Nerve, are carried from thence into the loweſt hollowneſs of the Belly, where they make the infolding which is the loweſt of the *Abdomen*, *Fig.* 11. ☽. ♀. ♀. ♀. That here ſo many nerves, to wit, ſix large ones joyning together do make but a ſmall infolding, *viz.* a leſſer than is raiſed higher in a ſingle branch of the nerve; the reaſon is, becauſe this infolding is like an Inn, where the infolding Spirits dwell no long time, but it receiving them only in their paſſage, preſently commits them to other infoldings placed here and there above, below and of one ſide, and made for divers offices; for from hence the chief paſſage, and as it were a broad way, leads to the greateſt infolding of the Meſentery; moreover, from hence nerves, diverſly going out, make three other infoldings, which reſpect the parts and ways by which the ſeveral Excretions, to wit, of the Dung, Urine, and Seed are made in the lower Belly.

The firſt Nerve therefore ſent out of this loweſt Infolding into the greateſt of the Meſentery, a little before it reaches to it, imparts two noted ſhoots to the Glandula's of the Womb; but in its aſcent it admits four other branches, as it were ſubſidiary, *viz.* two on either ſide from the intercoſtal pair, *Fig.* 11. ☓. ſo that the nerve here ſeems to be the chief means of paſſage of the animal Spirits deſtinated to the greateſt infolding of the Meſentery and to the uterine Glandula's; which paſſage however is carried into the deſigned parts, not immediately; but a compaſs being made, it firſt goes forward beyond its bound, and at length with a certain going back. The reaſon of which is, that the motions of all the Inteſtines, *viz.* the Vermiculations ſhould be directed downwards towards the ſtraight Inteſtine, and alſo that the actions of the Womb ſhould tend thither; therefore 'twas fit, that the animal Spirits ſhould be ſupplied from below whither the motion inclined. For by the like means, this Meſenterick nerve and the two returning nerves, being firſt carried lower, aſcend into their Provinces; to wit, that they may pull together the reſpective parts toward that bound placed below, as it were to a Pully.

Further, for this end, to wit, that the influence of the Spirits actuating ſome Inteſtines, might be derived lower; the other infolding of the Abdomen, to wit, the leaſt, is added immediately to this. Becauſe upon the Nerves being carried from hence about an inch, there grows a ſmall infolding; out of which, one nerve being ſent out into the greateſt infolding of the *Meſentery*, ſtretches it ſelf under the top of the ſtraight Inteſtine and part of the *Colon*. *Fig.* 11. ☿. *α*. And another nerve, deſcending from this infolding, is carried under the loweſt part of the ſame ſtraight Inteſtine, *Fig.* 11. *b*. which alſo, two ſhoots carried from the infoldings placed in the *Pelvis* or Baſon, meet, *Fig.* 11. *d. d.* It will not be hard to declare the uſes of this infolding and its nerves: becauſe all thoſe nervous paſſages are emptied about the offices and motions of the ſtraight Inteſtine. The aſcending nerve directs the Vermiculations of the ſame ſtraight Inteſtine, as alſo of the the lower part of the Colon, and then (the greateſt infolding of the Meſentery mediating) of ſome other Inteſtines to be made downwards; but the deſcending nerve, in oppoſition to the other, drawing the loweſt part of the ſtraight Inteſtine upwards, takes care that the Excrements being

being carried towards the Arſe-hole, may not ſlide out ſuddenly and unexpectedly. Then foraſmuch as two nerves from the two infoldings placed within the Baſon or Tunnel, (which infoldings immediately admitting a noted Vertebral branch, are partakers of the ſpontaneous Function) meet with this deſcending nerve, and are ingraffed into it; it comes to paſs from all of them together, that the Excrements being detained at the doors, when it ſhall be convenient, the Appetite commanding are caſt out. Nature, that it might ſhun filthineſs, is ſo careful, that for the carrying out of the Excrements it conſtitutes nervous Veſſels, with as noted a proviſion, as for the performing any where of the moſt ſplendid offices.

From the loweſt Infolding of the *Abdomen*, two nerves being ſent into the Tunnel, receive there on both ſides a noted Vertebral Nerve; and ſo conſtitute two infoldings, to wit, one in either ſide, *Fig.* 11. *CC. KK.* Theſe infoldings near the doors, placed before the chief excretory paſſages, ſerve for the opening and ſhutting them: a Vertebral branch comes to either as a ſupply; by which it comes to paſs, that beſides the increaſing the forces of the Spirits, their acts flowing from theſe infoldings, become in ſome meaſure ſpontaneous. By what means and for what end, the nerve aſcending from either infolding, is beſtowed on the ſtraight Inteſtine, was ſhewn but now. Moreover, two deſcending on both ſides, are carried into the neck or porch of the Womb, *Fig.* 11. *e. g.* Without doubt, whatever of ſenſe or motion is made about the Venereal acts, is owed to the influence of the Spirits through theſe Nerves. In Men the delightful proviſion of the Genital humor, and in Women the no leſs pleaſant reception of the ſame depends on the action of thoſe nerves. Laſtly, from the ſame infolding another nerve deſcending and broken into certain ſhoots, is diſtributed on both ſides into the Bladder and its Sphincter, *Fig.* 11. *f.* Certainly by theſe nerves the buſineſs of making water is performed, and when at any time the ſame is painful, the troubleſom ſenſe is impreſſed on them. But foraſmuch as the nerves dedicated to the ſeveral Excretions proceed on both ſides from the ſame infolding, therefore the acts of them all are in ſome meaſure alike among themſelves, ſo indeed, that if any excretory paſſage ſhould be weak or ill affected, it ſends forth its charge which it ſhould keep, whether it will or no. This is ſo well known, that there is no need to illuſtrate the matter with inſtances.

Theſe Nerves and Infoldings being ſo made, there is not much buſineſs beſides left for the intercoſtal pair. About the beginning of the *Os ſacrum*, both Trunks inclining mutually one to the other, communicate among themſelves by a croſs ſhoot, or two, then they end in very ſmall Fibres, which are diſtributed into the Sphincter of the *Anus*, *Fig.* 11. *q. r. s.* Here the intercoſtal pair is after the ſame manner, as we have obſerved concerning the wandring pair; to wit, either nerve being brought to the end of its courſe, before they enter upon their laſt task, incline themſelves to mutual embraces. Concerning the laſt offices of either pair, this Conformity may be alſo noted; that whenas the *Viſcera* dedicated to Chylification, to wit, the Ventricle and Inteſtines, are ſtill continued to the laſt by the ſame paſſage and the ſame perpetual cavity or hollowneſs; the firſt doors of this Cavity, to wit, the Orifices of the Ventricle, are kept by the loweſt branches of the wandring pair joyned among themſelves; but before the laſt door of the ſame, to wit, the *Sphincter* of the *Anus*, the extremities of the intecoſtal pair, alſo before joyned among themſelves, are placed. But to this part, as if it had never provided enough for it, beſides the nerves ſent hither from either infolding next above, and theſe extreme productions of the intercoſtal pair beſtowed on it, a branch alſo and certain fibres from the Vertebral nerve are inſerted, *Fig.* 11. *i. k.* By the acceſs of which it comes to paſs, that the ſhutting and opening of this door-keeping Muſcle becomes ſpontaneous. Truly many nerves, and thoſe of a diverſe kind, are diſtributed into the *Sphincter* of the *Anus*, to wit, becauſe the nutritious Juyce and its ſtinking recrements, like a certain Chymical matter, are digeſted within the Inteſtines, as it were within a *Matrice*; therefore Nature, which beſt underſtands Chymiſtry, is very careful about the well-ſtopping the mouths of the Veſſels.

From the ſame Nerve, *viz.* the laſt Vertebral, out of which a branch diſperſes fibres into the *Sphincter* of the *Anus*, two other Nerves proceed, which are carried into the Yard, *Fig.* 11. *l. m.* The greater of theſe, which is very large and long, is diſtributed into the nervous Body of it; the other leſſer, into its Muſcles. This member, becauſe it receives nerves only from the ſpinal Marrow, according to our Hypotheſis, ought to ſwell up and to be moved only at the ſpontaneous pleaſure of the will: but that oftentimes, by reaſon of the ſwelling up of the Genital ſeed or humor, it is erected and blown up with Spirit, whether one will or no, that is cauſed chiefly for this reaſon, Becauſe from this Vertebral pair from whence the nerves of the Yard ariſe, a nervous proceſs is ſtretched out into the Vertebral pair next above it: in which the infolding, placed in the Tunnel, imparting nerves to the *Proſtatæ*, is radicated, *Fig.* 11. *I. K.* into which infolding alſo a noted nerve from the intercoſtal pair is implanted. When therefore a communication is had between the *Proſtatæ*, which depend much on the intercoſt Nerves and the Yard, (by reaſon of the roots of either being joyned together by the nervous proceſs) it comes to paſs, that the action of this follows the affection of thoſe parts; but thoſe parts, *viz.* the *Proſtatæ*, are apt to be moved, not only by the turgeſcency of the Seed, but alſo by the paſſage of the intercoſtal Nerve are wont to be irritated with too unſeaſonable an action, according to the impreſſions made by the Senſes or the Brian; into the conſent of which preſently the Yard is excited.

Concerning the Nerves which belong to the Teſticles, here is not much to be ſpoken; for we have often ſought in vain for a great company of nervous paſſages in them: I have very diligently ſearched ſometimes in Man, alſo in a Fox, Dog, Calf, and likewiſe in a Boar and Monkey, but could never find belonging to them but one nerve carried from the Vertebral pair, which alſo for the moſt part is beſtowed on the

the Cremaſteral Muſcle, *Fig.*11.*M.* ſo that, although an excellent humor is prepared within thoſe parts, yet it doth not eaſily appear, that its matter is derived thither through the nerves; for we think the Genital humor is no more diſpenſed by the nerves than the nutritious. For truly it ſeems, that the Arteries inſtil a ſpirituous liquor into the Teſticles after the ſame manner as in the Brain; wherefore in their neighbourhood theſe ſanguiferous Veſſels being very much divaricated or ſpread abroad, are turned about into little ſerpentine chanels, whereby they ſubtilize the humor deſtinated to the Teſticles, and inſinuate it, having put off all thickneſs and Feculency, and being truly ſublimated, into their ſubſtance; becauſe there, as within the Cortex of the Brain, the ſpirituous liquor being imbued with a volatile Salt implanted in the part, paſſes into the moſt noble *Clyſſus*, *viz.* the Genital humor. But here is not a place to diſcourſe more largely of the nature and origine of the Seed: yet becauſe it is commonly objected, That the Seed is made of the nervous Juyce and plenty of Spirits fetched from the Brain, and therefore a large expence of it doth induce quickly on the Brain and Nerves a great debility and enervation; I ſay, this comes to paſs, becauſe after great profuſions of the Seed, for the reſtauration of the ſame humor, (of which Nature is more ſolicitous than for the benefit of the individual) preſently greater Tributes of the ſpirituous Liquor are required from the blood to be laid up into the Teſticles: wherefore the Brain is made languid, being defrauded of its due ſtock and afflux of the ſame ſpirituous liquor; and the Spirits influencing it and the nervous *Syſtem*, becauſe they are deficient in the Fountain it ſelf, are very much depauperated and become flagging. Beſides we may add, That the animal Spirits alſo which actuate the *Proſtatæ* coming from the ſpinal Marrow, are conſumed about the Venereal acts very much; ſo that the Loyns are alſo enervated for this reaſon.

CHAP. XXVIII.

Of the Spinal Nerve an Acceſſory of the wandring Pair; alſo of the Nerve of the Diaphragma.

AFter we have unfolded the Nerves of the wandring and intercoſtal pair, which being Executers of the involuntary Function, are ſtretched out to the *Præcordia* and all the *Viſcera* of the middle and lower Belly, and alſo to ſome other parts: Next to theſe follow ſome other Nerves communicating with the aforeſaid in the beginning, or in the exerciſe of the ſame office, *viz.* the ſpinal Nerve and the Nerve of the Diaphragma; of which we will ſpeak in order.

We have already ſhewn, that the Nerve of the wandring pair in the beginning is made up of numerous Fibres: to which is joyned another noted Nerve ariſing from afar, and being ingraffed with them, goes forth together with them out of the Skull. Concerning this Nerve, becauſe the beginning and diſtribution of it being very irregular, have not as yet been noted by other Anatomiſts, it may ſeem worth our labour to make a little more diligent inquiry. Therefore if we would ſearch into the beginning of this nerve, that is found beginning with a ſharp point in the ſide of the ſpinal Marrow nigh the ſixth or ſeventh *Vertebræ* of the Neck, *Fig.*12.*C.C.* But being increaſed in its aſcent, is no where inſerted into the medullar Trunk, but in its whole tract on both ſides lean on its ſide, to which it is knit by certain admitted Fibres towards the ſuperficies. This ariſing up from the Neck after this manner, and being carried within the Skull, is joyned to the Fibres of the wandring pair, and is ingraffed with them ſeeming to grow together into one Trunk, and goes out with them at the ſame hole from the Skull; which being paſſed through, the ſpinal Nerve preſently departing from the Trunk of the wandring pair, is at length reflected outward, *Fig.*9. ♀.♂. This ſtranger or travelling nerve after a ſhort commerce having left his companion, is carried upon the Muſcles of the Neck, to which it imparts ſome ſhoots, and is inoculated with a certain ſhoot of the tenth pair; but from thence being carried on further, it goes alone by a long paſſage, till it comes to the Scapular Muſcle, on which it is almoſt wholly beſtowed, *Fig.* 9. D. This nerve is found conſtantly, not only in Man and four-footed Beaſts, but alſo in Fowls and Fiſhes; and in theſe it ſeems to be deſtinated inſtead of Arms, and for the moving of their wings and fins.

Concerning the uſe of this Nerve, and the reaſon of its irregular beginning, we ſhall conjecture after this manner: Foraſmuch as that is deſtinated for the performing the motions of the Muſcles belonging to the Arms and Neck, therefore it ought to ariſe out of the ſpinal Marrow: but that it is not carried by a direct and near way into its Province, but being carried about by a long compaſs before it enters upon its task, communicates in its beginning with the nerve of the wandring pair; certainly this ſeems to be done, to the end that this Spinal nerve, being carried into the parts of the wandring pair, might perform the acts of the Function only involuntary. And indeed it may be obſerved, That beſides the ſpontaneous motions wherewith the Neck and Arms are wont to be imployed with the previous intention of doing this or that thing, thoſe parts alſo, before any other member, are affected with pathetick and ſudden motions,

ons, according to the force of the Paſſions, the animal not being conſcious of it. For almoſt all living Creatures do not only turn about their necks at any noiſe to behold whatever might cauſe fear; but they being any ways affrighted, in the twinkling of an eye fly away, their feet, wings, fins, or other part anſwerable to them, being ſet into a rapid motion. The Neck and the Arms are pliable or obſervant, not only to fear, but in like manner to the other Paſſions. For brute Animals, as well as Man, being puffed up with pride or anger, (as we have elſewhere intimated) have their Necks ſwollen, and their Creſts liſt up: But as to Man, his hands and Arms are ſo obſequious to the Paſſions, and almoſt to all the conceptions of the Brain, that they are continually agitated in the doing of any other thing with various geſtures, whereof we are ignorant or not willing them: we ſcarcely think or ſpeak any thing but at the ſame time the hands are flung out here and there; and whilſt the Tongue heſitates or ſticks, or the words as it were ſtick between the Jaws, the right hand is exerciſed, as if by its geſture it were endeavouring to draw out more ſwiftly the ſenſe of the mind. Truly that theſe parts, to wit, the Hands and Arms, do ſo nearly conſpire with the Affections of the Brain and Heart in their motions in ſome meaſure in all living Creatures, but more eminently in Man, the cauſe ſeems to be this nerv's coming from the ſpinal Marrow to the beginning of the wandring pair, and communicating with its nerves, and receiving from them as it were the note or private mark of the involuntary Function.

So much for the ſpinal Nerve, which alſo like a ſhrub, growing from other ſhrubs, hath no peculiar origine, but having received various fibres, is radicated for the greateſt part in the ſpinal Marrow, and (as hath been ſhewn) partly in the nerve of the wandring pair. Concerning the nerve of the Diaphragma, of which we ſhall ſpeak next) many things occur no leſs worthy remarking. As to its beginning, it may be obſerved, That it ariſes from the brachial nerves with a double or triple root; to wit, two or three ſhoots going out of the aforeſaid nerves, grow together into the ſame Trunk, which is the nerve of the *Diaphragma*. In man its firſt ſhoot, which is alſo the greateſt, is produced out of the ſecond Vertebral nerve; and when the firſt brachial nerve ariſes from the ſame handful of Vertebral nerves going out at this place, the aforeſaid ſhoot is rooted in its origine: wherefore, when in Brutes the firſt brachial nerve ariſes from the fourth or fifth Vertebral, the nerve of the *Diaphragma* alſo begins its riſe far lower: two other ſhoots ariſe out of the ſame ſtocks of the brachial nerves which follow next, *Fig.* 9. ϒ. Φ. But the Trunk which is made out of theſe ſhoots goes forward ſingle through the paſſage of the Neck and the cavity of the *Thorax* without any branching forth, even to the *Diaphragma*, *Fig.* 9. χ. where being at laſt ſtretched out into three or four ſhoots, it is inſerted on either ſide to the fleſhy or muſculous part of it: ſo that, becauſe the *Diaphragma* is a Muſcle, and performs both its motions, to wit, *Syſtole* and *Diaſtole* by its own Fibres, the office of either nerve is only to carry bands or forces of animal Spirits requiſite for the indiſcontinued action of that part, and alſo to convey thither the Inſtincts of the Motions variouſly to be performed.

As to the firſt uſe of this Nerve, *viz.* for the paſſage of the animal Spirits, the buſineſs is performed in this Muſcle, as it is in the Heart. The Spirits flowing into the *Diaphragma* by the nerves, receive ſubſidiary Forces, to wit, a ſulphureous Copula from the blood, upon whoſe exploſion being ſtill iterated by turns, and the receiving of new, the action of this perpetual moveable depends. Concerning the Inſtincts of the Motions tranſmitted by the paſſage of this double nerve, we may obſerve, That they are, eſpecially in man, of a double kind: *viz.* either the action of the *Diaphragma* merely natural for the performing of Reſpiration, is continually reciprocated according to the uſes of the Heart and Lungs, and altered many ways in their tenour according their needs; or ſecondly, a certain irregular and unuſual motion of the *Diaphragma* is wont to be excited at the beck of the Appetite, or from the inſtigations of other parts; for the which, whilſt the reſt of the Organs of Reſpiration are compelled to conſpire, the act it ſelf of Reſpiration becomes after a various manner interrupted or unequal.

1. As to the firſt of theſe, *viz.* the unforced motion of this Muſcle, it may be obſerved, That the *Diaphragma*, with the Muſcles of the *Thorax* and the parts of either, conſpire in their motion with the action of the Lungs and Heart: and that between all theſe ſuch a joynt action may be ſuſtained, it is obſerved, That three or four branches are ſent out from the Vertebral nerves, in the branches of which the nerve of the *Diaphragma* is rooted, into the intercoſtal infolding, *Fig.* 9. Θ. and whereas from this infolding the nerves are carried into the Muſcles of the *Thorax*, by this means a communication and conſent of action is effected between theſe and the *Diaphragma*. Therefore the *Diaphragma* drawing with it ſelf the Muſcles of the *Thorax*, by reaſon of other nerves, conſpires with the *Præcordia*. Theſe in man going from the intercoſtal nerve, are already deſcribed; and in Brutes from the lower infolding of the wandring pair a nerve is ſent down into the infolding of the *Thorax*, to which beſides ſo many ſhoots and certain fibres reaching forth into the nerve of the *Diaphragma*, are inſtead of ſuch a commerce.

2. The Animal and irregular motions of the *Diaphragma* proceed from various cauſes and from the divers inſtigation of other parts, which alſo in man become much more ſignal than in brute Animals; becauſe in him the communication is notable by the nerves reaching out from the Cervical infolding of the intercoſtal pair into the nerve of the *Diaphragma*; which kind of infolding and nerves are wanting in Brutes.

As

As to the Species themſelves of irregular motions into which the motion of the *Diaphragma* is wont to be perverted, it may be obſerved, That we are able at our pleaſure to ſtop breathing or reſpiration for ſome ſpace, and preſently to take it or draw it out. In laughing, weeping, and ſinging ſometimes the *Syſtole*, ſometimes the *Diaſtole* becomes ſtronger, and is made frequenter upward or downward with a repeated ſhaking; which ſort of actions of it are made by reaſon of thoſe near commerces had between the nerve of the *Diaphragma* and other reſpective parts of the Breaſt and Face; yea indeed from hence it is effected, (as we have already ſhewn) that man is peculiarly a laughing Creature. Further, (which we have ſhewn elſewhere) from the Sympathy which happens between the parts of the Mouth and Face with the *Diaphragma* by thoſe nerves, a good reaſon of ſneezing may be given, and that Problem of *Ariſtotles* eaſily ſolved, to wit, why men alone, or chiefly before other Creatures, ſneeze, For the act of ſneezing ſeems to be made for this end, that man may not only clear his Noſe, but that all Torpor or heavineſs may be ſhook off for him from the neighbouring Organs of the Senſes, yea and from all the fore-part of the Brain: which thing eaſily ſucceeds, if the Membranes and nervous paſſages beſmearing the Noſtrils and the Sieve-like Bone, like the holes of a Sponge, being ſtrongly wrung forth or ſqueezed together, be forced to ſhed forth their moiſtures; for theſe parts ſo emptied, preſently like a preſſed Sponge, receive other humors, to wit, thoſe coming from the neighbouring parts. In the mean time, that the watry heap ſo laid up about the caverns of the Noſtrils, may be emptied, it ought to be carried away, or wiped out from thence by a vehement blowing of the Air or breath. Wherefore it is obſerved, That whilſt the inward parts of the Noſtrils being very ſenſible, begin to be wrinkled together from ſome ſharp thing pulling or pricking them, and by that means to draw out the watry humor preſently by reaſon of the paſſage from thence by the branches of the fifth pair into the intercoſtal Trunk, and from thence by the paſſage of the nerves which are extended from its Cervical infolding into the nerve of the *Diaphragma*, the conſent of the ſame Action or Convulſion is produced even into the croſs bound or Midriff; ſo that by the ſame Act as it were with which the Noſtrils are wrinkled, the *Diaphragma* alſo with the *Diaſtole* being ſtronger and longer drawn out, is depreſſed, that the Breaſt being dilated as much as may be, the Air may be the more copiouſly inſpired. Then as ſoon as the Spaſm or Convulſion of the Membranes, drawn together within the Noſtrils and fore-part of the Head, begins to remit, preſently the Midriff leaping back with a force, cauſes the inſpired Air to be violently exploded or drivenout, which ſtrongly wipes away and carries forth with it the humor preſſed out within the caverns of the Noſtrils.

We yet ought to inquire concerning the Nerve of the *Diaphragma*, what is the reaſon, that it always proceeds from the Brachial nerves, and why it doth not rather ariſe immediately from the ſpinal Marrow. Truly from hence it ſeems to follow, that the motion of the Arms in ſome ſort reſpects the action of the *Diaphragma*; or on the contrary, that this depends on that. Indeed between theſe two a certain reſpect or habitude happens; which eaſily appears by this Argument: The Arms or fore-Legs in all Creatures are made for labour and hard exerciſe; becauſe by the force of theſe men fight, and perform the moſt hard and laborious things, and Brutes run and aſcend the moſt ſteep places with great pains. But it is very well known, that by too much labour and over-vehement motion of body, the act of Reſpiration is very much increaſed, ſo that the breath almoſt fails, and is oftentimes in danger to be loſt. The reaſon of this is, becauſe by great exerciſe the blood is too much forced into the boſom of the Heart, which, leſt it ſhould ſuffocate it, that it might be emptied into the Lungs, very frequent and difficult Reſpiration is inſtituted. Therefore from hence may be inferred, That the exerciſes of the Body ought to be regulated according to the ſtate of the *Præcordia*; or that the motion of the Arms ſhould obſerve the action of the *Diaphragma*, *viz.* leſt they being ſtirred by a violent motion, cauſe the blood to be driven more into the boſoms of the Heart, than the *Diaphragma* inſtituting a moſt frequent Reſpiration, can draw from thence into the Lungs. That this Rule may be perpetually obſerved of all living Creatures it is ſo provided, that the nerve of the *Diaphragma*, chiefly conducing to Reſpiration, ſhould be tyed, as it were a bridle, to the Brachial nerves, which are the principal in the motion of the Body, and ſo might timely warn theſe, if unmindful of their duty, and as ſoon as breath fails, ſhould command them to deſiſt from further moving the Body. Wherefore we obſerve, when at any time labouring Cattle are urged beyond their ſtrength in labour or motion, oftentimes either ſome deadly hurt of the heart follows, or elſe ſome uncurable diſeaſe of the *Diaphragma*; for by ſuch immoderate labour, either the Beaſt languiſhing quickly dyes, when it is commonly ſaid, that his heart is broke; or elſe the tone of the *Diaphragma* being wholly broken, Reſpiration ever after becomes painful and difficult: which is wont to happen ordinarily to Horſes, who are driven into too rapid a courſe with a full Belly.

CHAP. XXIX.

Of the Reaſon of the difference that happens between the Nerves of the wandring and Intercoſtal Pair in Man and brute Beaſts; alſo of the other Pairs of the Nerves ariſing both within the Skull, and from the Spinal Marrow: alſo ſomething of the Blood-carrying Veſſels which belong to the Spinal Marrow.

THus far we have deſcribed all the Nerves ſtretching out to the *Præcordia* and *Viſcera*, alſo to moſt of the other parts, which are the Organs of the involuntary Function, according to the manner by which they are wrought in man; and we have ſhewn their Offices and Uſes, and the Reaſons of the moſt noted appearances in all. Before we proceed to the other Conjugations of the Nerves, it behoves us to ſhew with what difference the aforeſaid Nerves are found in brute Beaſts, and for what end ſuch a difference is ordained.

It was already intimated, That the Trunk of the wandring pair in four-footed Beaſts doth ſend forth to the Heart and its Appendix more nervous Veſſels than in Man. The reaſon of which is obvious; becauſe the Cardiack nerves in Brutes proceed almoſt only from this pair, and ſcarce at all from the intercoſtal; wherefore when they are only of one orgination, therefore more are required, all which notwithſtanding are much fewer than the ſame are in Man from a double ſtock, *viz.* being carried from both the Nerves: foraſmuch as Beaſts want prudence, and are not much obnoxious to various and divers Paſſions, therefore there was no need that the Spirits ſhould be derived from the Head into the *Præcordia* by a double paſſage, *viz.* that one ſhould be required for the exerciſe of the vital Function, and the other for the reciprocating impreſſions of the Affections; but that it may ſuffice, that all thoſe deſtinated to every one of their offices, may be carried ſtill in the ſame path.

In moſt Brutes the interçoſtal Nerve goes alone from the Ganglioform infolding of it almoſt without any branching to its infolding of the *Thorax*: in which paſſage however it is not always after the ſame manner in all; for in ſome it is carried ſingle and apart from the Trunk of the wandring pair, nor doth it communicate with it in its whole journey, unleſs a little higher by a ſhoot ſent down from the Ganglioform infolding: but in many the intercoſtal Nerve paſſes preſently from its Ganglioform infolding into the neighbouring infolding of the wandring pair, *Fig.* 10. *C.* where, when both nerves ſeem to cloſe together, from thence both being involved under the ſame common incloſure, as it were one Trunk, they are carried together till it comes over againſt the firſt Rib, and there an infolding being made, the intercoſtal nerve, departing from the wandring pair, is carried into the infolding of the *Thorax*; and the other nerve alſo is ſtretched between this and that infolding: which nerves, when one is carried under the other above the Artery of the Chanel-bone, making as it were an handle, ſtraiten its Trunk, *Fig* 10.*g*.

Although the intercoſtal Nerve is carried from the Throat to the top of the *Thorax* under the ſame ſheath with the Trunk of the wandring pair, yet it is not united to it; but they remain diſtinct ſtill both of them in the whole tract, and the Membrane being diſſected, they eaſily ſeparate one from the other, unleſs they be knit together by ſome fibrils ſent from one another in ſome places: but foraſmuch as by this means the intercoſtal nerve being joyned to the Trunk of the wandring pair, goes under its cover, it ſeems to be ſo made only for its ſafety and better paſſage: wherefore in ſome perhaps where the intercoſtal Trunk is greater, or the courſe of its paſſage ſhorter, where ſuch a ſafeguard is not needful, it deſcends alone. We have ſeen this Nerve covered with the ſafeguard of the wandring pair of one ſide, and in the other to have gone out by it ſelf alone.

Whether the intercoſtal Nerve departs from the lower Infolding of the wandring pair or not, however a branch is ſtretched out between this infolding and that of the *Thorax* in many, perhaps in all brute Beaſts, which in its paſſage binds about the Vertebral Artery, whereby the *Sympraxis* or joynt Action between the *Præcordia* and the exterior Organs of Reſpiration is ſuſtained: yea from this lower infolding of the wandring pair ſometimes we have obſerved a ſhoot and fibres to be carried to the beginning of the Brachial branch, in which the nerve of the *Diaphragma* is rooted; alſo ſometimes, though rarely, we may have ſeen ſome ſhoots ſent from the infolding of the *Thorax* towards the Heart and its Appendix. In a Monkey above this infolding of the *Thorax*, as we have intimated before, were ſome ſhoots and ſmall branches reaching from the intercoſtal nerve towards the *Præcordia*.

We

We may take notice concerning thoſe Nerves below the *Præcordia*, diſtributed every where into the Ventricle and the lower *Viſcera*, that there is ſcarce any difference of them in Man and Beaſts. The nerve of the *Diaphragma* is placed lower in four-footed beaſts: the reaſon of which is, becauſe the Brachial nerves, out of which that ought to proceed, ariſe lower; to wit, becauſe Brutes have longer necks, as if deſtinated to the yoke. Theſe things being thus premiſed concerning the difference of the Nerves in either Species, it remains that we paſs on to the unfolding the remaining pairs of them.

Therefore of thoſe ariſing within the Skull, the ninth pair is made up of many Fibres alſo in its beginning, (as was ſhewed before) out of which being gathered together, one Trunk being made is carried towards the Tongue, through whoſe whole ſubſtance, to wit, from the bottom to the top, having paſſed, it diſperſes in its whole paſſage ſmall ſhoots on either ſide, *Fig. 9.* ☉. So that nothing is more obvious than that this nerve performs the motions of the Tongue requiſite for the articulation of Sounds, as the nerves of the fifth pair ſpread into this member, ſerve for the diſtinguiſhing of Taſtes; for the exerciſe of either Faculty, *viz.* both motive and ſenſitive, the texture of Tongue being notedly fibrous, hath the virtue of a double Organ; therefore by the two nerves, beſides the ſupplements of Spirits, are carried both the Inſtincts of the Motion and the ſenſible Impreſſions.

That the aforeſaid Nerves of the ninth pair may more eaſily perform the motions of the Tongue, it ſends forth downward one ſhoot before the entrance of the Tongue, which is united with a ſhoot from the tenth pair meeting it deſtinated to the *Sternothyroeidal* Muſcle; and the other little branch of the ninth Conjugation is diſtributed into the Muſcles of the Bone *Hyoides*, *Fig. 9.* ⊙.⊙. In truth theſe ſhoots being ſent down as ſo many little ropes, conduce to the moving of the Muſcles, which are fixed to the bottom of the Tongue, which Muſcles being placed as ſo many Props to the Tongue, do facilitate its motion.

The Nerve of the tenth pair, although it may ſeem to ariſe within the Skull with many little Fibres alſo, yet being ſent down from thence into the bony Cloiſters of the *Spine*, not ariſing but within the firſt and ſecond *Vertebræ*, it is carried without. Preſently after its entrance it ſends forth two nerves into the infolding of the intercoſtal nerve; for what end hath been already ſhewn: But its chief Trunk ſpreading downwards, and receiving a ſhoot produced from the ninth pair, is beſtowed on the *Sternothyroeidal* Muſcle. Moreover, this nerve reflects branches outwards, which are diſtributed into the Muſcles of the Neck reaching out towards the hinder part of the Head; ſo this pair, as if it were only of the number or rank of the Vertebral nerves, imparts ſome branches to the intercoſtal nerve, and all the other ſhoots and branches of it ſerve for the performing of the motions of the Muſcles of the Neck, *Fig. 9. H.* ✳.□.△.

So much for the Nerves ariſing within the Skull, which (as was ſhewn) having their being from the parts of the Brain or Cerebel, are deſtinated to the offices of the ſpontaneous or the involuntary Function, and are chiefly diſtributed into the Organs of the Senſes or the *Viſcera* of the vital and natural Faculty. There remain many other Conjugations of Nerves, the roots or beginnings of which conſiſt in the ſpinal Marrow, which is only the exterior production of the oblong Marrow. Theſe ſpinal Nerves, beſides ſome branches that they beſtow on the intercoſtal pair, are imployed almoſt wholly on the muſculous ſtock, and the office of them is to carry outwardly the forces of the Spirits and the Inſtincts of the Motions to be performed, and to convey inwardly the impreſſions of ſenſible things. Foraſmuch as the ſpinal Marrow ſeems to be derived from the Brain, and is as it were a broad and high road produced or leading from the ſame, without any paths or tracts inſerted to it from the Cerebel, therefore the animal Spirits flowing within its nerves, do almoſt wholly execute the Acts of the ſpontaneous Function.

To deſcribe all the ſeveral pairs of the ſpinal Nerves, and to rehearſe all their branchings, and to unfold the uſes and actions of them, would be a work of an immenſe labour and trouble: and as this *Neurologie* cannot be learned nor underſtood without an axact knowledge of the Muſcles, we may juſtly here forbear entring upon its particular inſtitution: but it may ſuffice concerning theſe nerves and their medullar beginning, that we advertiſe only in general what things may occur moſt notable and chiefly worth taking notice of.

As to the Nerves therefore produced out of the ſpinal Marrow, it may be obſerved, That in both ſides of it, nigh the outward margine or brim, four or five Fibres ariſe in the ſuperior brim, and as many in the inferior: either maniple or handful paſs through with diſtinct Fibres the *Pia Mater*, or the loweſt Coat ſpinal Marrow, which is as it were the common ſheath of them all; but afterwards the Fibres paſſing through the third Membrane of either margine, (for three cloath the ſpinal Marrow) they joyn together, and having cloathed themſelves with a Coat gotten from the ſecond Membrane, they become as it were one Trunk; which Trunk going out at the ſpace between the knot of the *Vertebræ*, is again divided into many nerves deſtinated to ſeveral parts. After this manner in the whole tract of the ſpinal Marrow, the Vertebral nerves have their birth; but in thoſe places where the *Brachial* and the *Crural* nerves go out, both the thickneſs and the breadth of the ſpinal Marrow are increaſed, and alſo the handfuls or bands of the Fibres are larger. All theſe are well repreſented in *Fig.* 12.

The Brachial Nerves are not only far greater than the Vertebrals, ſo that they appear as it were large and broad nervous chords; but that they may conſpire together, and ſerve for the ſtrong motions of the Arms, or the fore-Legs of Beaſts, it is obſerved, That very many of them are knit together by the croſs nervous Proceſſes. Theſe Proceſſes in four-footed Beaſts (the fore-Legs of whom are deſtinated for un-

weariable pains and difficult labour) are produced croſs-ways after a curious manner, as may be diſcerned, *Fig.* 16. *l.l.* The uſe of theſe ſeems to ſuſtain not only the conſent of action in many nerves together, but alſo their mutual ſtrength; that ſome bands of Spirits might awaken or ſtir up others, and for the exerciſing ſtrongly the locomotive force, they might mutually ſupport and relieve one another. And not much unlike this, the buſineſs is about the Crural Nerves, where nervous cords ſignally large, being produced from the Junctures of the *Vertebræ*, whilſt they deſcend towards the Thigh, they which are above receive in their whole tract the nervous Proceſſes which are ſent out ſtill from thoſe below, *Fig.* 11. *p.p.p.*

We may yet take notice farther concerning the ſpinal Marrow, that as it ſends out Nerves by bands, and as it were by troops, in an orderly ſeries and military order; ſo its ſanguiferous Veſſels are diſpoſed with no leſs ſignal artifice. For thoſe which are carried in the ſuperficies of the ſpinal Marrow, and the Arteries, Veins, and other Sanguiducts, which are nigh its compaſs, do contain ſome things more rare and highly worth the noting.

In the firſt place we may obſerve, That the blood-carrying Veſſels do cloath the whole ſubſtance or frame of the ſpinal Marrow, as well as the oblong Marrow with a thick ſeries of ſhoots; which may be made more manifeſt to any one, if firſt of all Ink were injected into the Vertebral Artery; for from ſuch an injection often repeated, it will eaſily appear, that the infoldings of the Veſſels do cover as it were in the ſhape of a Net, the upper tract of the Marrow. But by what means theſe Veſſels proceed on both ſides from the Trunk of the Vertebral Artery, and alſo the blood-carrying Veins, which are deſtinated to the whole ſpinal Marrow, and the inferior portion of its arterious paſſages, doth not ſo plainly appear; becauſe the bony Cloiſters of the *Vertebræ* are not broken through without much labour, eſpecially in grown up living Creatures; and in that work the beginnings and branchings out of very many Veſſels are wont to be blotted out: But that we might more accurately ſearch into theſe hid things, we made the diſſections of ſeveral *Embryons*, in which we were able to diſſect more narrowly into all the receſſes of the Bones: further, that all the tracts and branchings out of them might be the better perceived in all the Veſſels, we did caſt in divers coloured Liquors. And we had our deſired wiſh: for preſently we found with much admiration, that thoſe kind of Veſſels, *viz.* Arteries, Boſoms, and Veins, which reſpect the Head, belong alſo to the ſpinal Marrow with no leſs a noted diſpoſition of proviſion.

When we did diſſect the Heads apart from the Spine, we did think, according to the Opinion of the Vulgar, that the Vertebral Arteries did belong only to the Head: and when there did appear in the cut off Trunk of the oblong Marrow three arterious branches (as they are deſcribed above in the firſt and ſecond Table) therefore in the Explication of either Figure we have affirmed the Vertebral Artery to be carried with a triple branch into the hinder part of the Head. But the Vertebral Artery pays to the ſuperior part of the Spine as great Tributes of Blood as to the Head it ſelf; and that middle arterious branch, which is marked in the firſt Figure with the Letter T, in the ſecond with S, doth not aſcend into the Head, but deſcends from that concourſe of Vertebral Arteries towards the Spine, and conveys downwards from the common flowing together of the blood there made by many Arteries, the *Latex* for the watring top of the ſpinal Marrow. Wherefore in this place it ſeems convenient, that we do not only correct that errour of ours, but that we deliver an exact deſcription of all Veſſels which are deſtinated to the Spine, *viz.* which contain many wonderful things. As therefore theſe Veſſels are of a threefold kind, *viz.* Arteries, Boſoms, and Veins, we will expoſe each of them particularly; and firſt concerning the Arteries we ſay.

The Arteries which carry the Blood towards the Spine, are diſpoſed after one manner above the Heart, and after another below it. As to the firſt, whereas the Trunk of the *Aorta* being there cleft preſently into many branches, departs from the Region of the Spine, therefore the Vertebral Artery is produced on both ſides from its axillary branches, which aſcending ſtraight into the hinder part of the Head, ſends forth a branch into the meeting together of every *Vertebræ*: But below the Heart, foraſmuch as the *Aorta*, in its whole deſcent, lyeth on the Spine, two Arteries are received into the Spine from its bottom nigh its *Internodia* or ſpaces between the knots of the *Vertebræ*; ſo that if the Trunk of the *Aorta* be cut open long-ways, there will appear a ſeries of double holes through its whole tract, after a moſt curious manner, as in the head of a Lamprey.

The arterious Branches which are carried both above and below the Heart towards the Spine, becoming preſently forked, beſtow one ſhoot on the neighbouring Muſcles, and another they inſert into the Junctures of the *Vertebræ*; which being carried within the bony den, is cleft preſently into three branches, two of which are beſtowed on the medullar Trunk, and the other on the Membrane compaſſing about the bony den before, *Tab.* 13. *Fig.* 3. *a.b.c.d.e.*

As to the ſhoots deſtinated to the medullar Trunk, they preſently tending two ways, and meeting with either maniple or band of nervous Fibres, aſcend towards their beginnings; and ſo one little Artery having got to the ſuperficies of the hinder Marrow, diſtributes into it hairy Veſſels: but the other arterious ſhoot, which is the greater and chiefeſt, as ſoon as it attains the margin of the former Marrow, is carried from thence by an oblique paſſage into the middle fiſſure or cleft of it, where meeting with a ſhoot of the pair of the other ſide, it is united to the ſame, and from that joyning together the arterious Trunk, as it were a common paſſage, and made up of either Vertebral ſhoot, deſcends into that cleft by the open ſpace of one of the *Vertebræ*, and in that ſhort paſſage both diſpenſes little Arteries on either

ſide,

ſide, and alſo inſerts them leaning on the *Pia Mater* more deeply betwixt the ſides of the Marrow: and ſo whereas in the whole tract of the Marrow, the chief Trunk of every Artery is carried into the middle cleft, it ſeems at firſt ſight, as if the ſame arterious Trunk were carried under the whole ſubſtance of the Marrow from the head to the tail, *Tab.* 13 *Fig.* 1. Further, as by a concourſe of ſeveral ſhoots of either ſide, the ſpinal Artery deſcends above the cleft of the Marrow; ſo where the Trunks of the Vertebral Arteries joyn together (which happens to be done ſometime in the hinder part of the Head above the oblong Marrow, and often in the Neck above the ſpinal) an arterious branch ſomewhat bigger than the reſt is ſtretched out downwards. This formerly (as we mentioned but now) we miſtook for the third aſcending branch of the Vertebral Artery. But I have often taken notice, that in Brutes, where the Vertebral Arteries have met together with an acute Angle above the medullar Trunk, they are preſently, departing one from another, ſtretched out directly to either brim of the Marrow, from whence immediately being bent back, they are carried again into a mutual meeting, ſo that between their two joynings together is made the figure *Rhomboides*, as it is in *Tab.* 13. *Fig.* 1. *C.* The reaſon of which without doubt is this; to wit, that the more rapid courſe of the blood going towards the Head might be hindred by its flood being a little ſpace divided.

The third Brancy of either Vertebral Artery being carried into the anterior Cavity of the bony Den, and being preſently made forked, tends to the right and left, and is on both ſides inoculated to the next ſhoot of the ſame ſide and by the croſs proceſs, they of either ſide are united after the ſame manner; and ſo all the Arteries of this cenſe or rank receive one another mutually, as it were links of a chain, in the whole tract of the Spine, and are continued in the ſame bending paſſage. If Ink be caſt into the Trunk of the Vertebral Artery and moſt of the hollowneſſes of the *Aorta*, all theſe Arteries dyed with the ſame, will appear a pleaſant ſpectale, like Net-work, as may be ſeen *Tab.* 13. *Fig.* 3.

The top of this arterious Infolding being carried into the Skull, inſerts two ſhoots ſent forth ſtraight into the wonderful Net, and imparts two others going out ſide-ways on both ſides to the *Dura Mater*: the lower end of the ſame reaching to the *Os Sacrum*, ends in very ſmall Veſſels which ſerve for the Membrane of the Bone.

If it ſhould be asked, For what end theſe Arteries being concatenated with ſuch frequent ingraffings are diſpoſed within the Back-bone: This ſeems to be ſo ordained for three uſes: *viz.* Firſt, Theſe Veſſels (as alſo the paſſages of the Boſoms) are divaricated after this manner with repeated compaſſing about, that a conſtant heat from the blood being ſo turned about, as it were into frequent Whirlpools, might be ſupplied about the compaſs of the ſpinal Marrow, as it were by a *Balneum Mariæ*; even ſuch a manner of office as the *Choroeidal* infolding performs within the infolding of the Brain. Secondly, Care is taken by this means, leſt the blood deſtinated for the ſpinal Marrow, might flow thither too plentifully, or might be defective in its due influx; for the blood being about to flow into the medullar ſtock plentifully, is diverted from the little branches *c.d.* into theſe Emiſſaries *e.f.* and in its defect the ſubſidiary proviſion being called out of the middle infolding through the chanel *e.* into the Veſſels *c.d.* is derived into the ſame medullar Trunk. Thirdly, The uſe of this arterious infolding ſeems to be, that the blood may be diſtributed from its paſſages into the Membranes, *viz.* which is carried every where from them through the Capillary Veſſels; the reliques of which alſo are ſupped back by the little chanels ſent out of the boſoms. Further, from this Store-houſe, if neceſſity urges, a certain proviſion is had for the wants of the Brain; wherefore from hence the ſmall Veſſels end in the wonderful Net.

So much for the Arteries diſtributed about the *Spine* or Back-bone; the Veſſels of the ſecond ſort are the Boſoms which come between the Arteries and the Veins for the uſe of the ſpinal Marrow no leſs than of the Head it ſelf, and are here ordained with a more curious implication. But the reaſon why boſoms are required to theſe more noble parts, and ſcarce to any in the whole Body beſides, is this, to wit, that about theſe bodies all manner of extravaſation, or any ſtagnation of the blood, might be hindered: but ſometimes the Veins are not ſufficiently emptied, that they may preſently receive from the Arteries the depoſited blood, and ſo may prohibit any flowing out of it; wherefore the boſoms, as more fit receivers, are deſtinated to that office, for that their receptacles are larger and ſoon emptied; and for that reaſon they may more conveniently derive the blood from either medullar ſubſtance, leſt it ſhould overflow it in the Head or Spine.

As to the Figure of the Vertebral Boſom, its paſſages being conform to the arterious infolding, are put under it in the whole tract of the Spine: for after a like manner, in either boſom, which is extended within the cavity of the bony Den, from the hinder pair of the Head to the *Os Sacrum*, there is one receiving Veſſel, by whoſe twofold chanels preſently the blood is brought back from either ſuperficies of the Marrow into the boſom, and another carrying back, by whoſe paſſage the ſame is exported into the Veins. Moreover, in many Animals (though not in all) the boſoms on either ſide ſeem to be knit together upon the knots between the *Vertebræ* by the croſs proceſſes, and ſo communicate between themſelves: either boſom in its top is contiuued into the lateral boſoms of the Head; further, from it on both ſides a paſſage lyes open into the Jugular Vein and into the Vertebral, *Tab.* 13. *Fig.* 4.

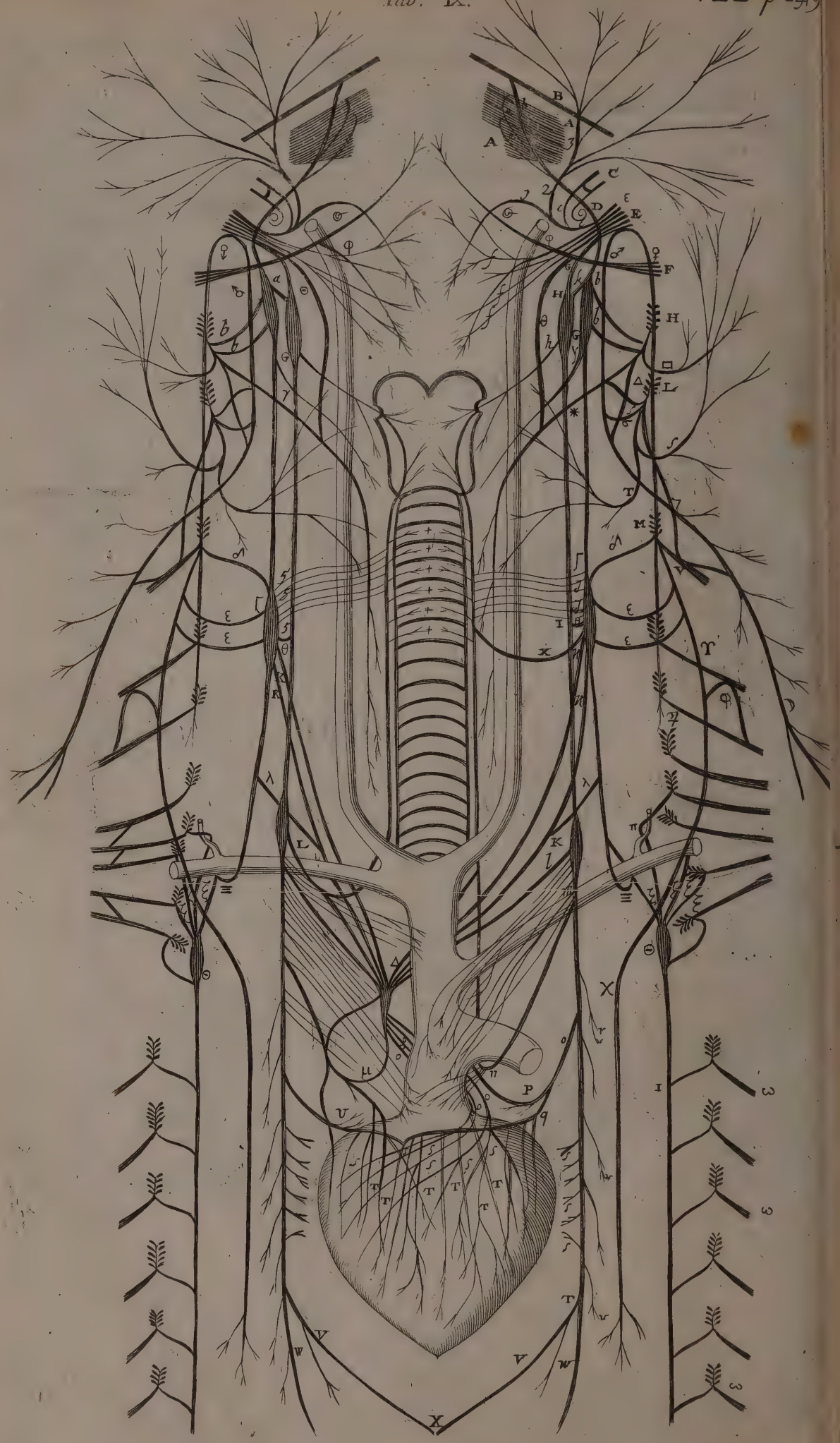
What the uſe of the aforeſaid Boſom is in general was but now intimated; to wit, that the blood depoſited from the Arteries in the ſpinal Marrow, might be preſently emptied from thence, and be retained within the more large Cavities of the Boſoms, till it may be transferred into the Veins being made more emptied: But the reaſon of the divers ſorts of implications, and the frequent ingraffings which is found about

about their little chanels, ſeems to be, that the blood, if by chance it being plentifully heaped up within ſome part of the boſom, ſhould there ſtagnate, or be apt to regurgitate into the Marrow, it might be drawn out by thoſe frequent Emiſſaries here or there into the middle or oppoſite ſide: after a like manner it is with the boſoms about the Spine, as when a Country-man digs his ground frequent croſs Furrows for the draining away any ſuperfluous moiſture.

There remains another uſe of the Vertebral Boſoms, of which we made mention before, to wit, that the blood nigh the medullar Body, being brought through their variouſly intorted Meanders, (like the arterious infoldings) might yield heat requiſite for the ſwift paſſage of the animal Spirits, as it were a *Balneum Mariæ*. That the bending tracts and complications of the Boſoms may be the better ſeen, a certain tincture may be caſt into the Vertebral Veins; and preſently that invading the paſſages of the boſoms and marking them, will exhibit the appearance of a long Ladder with many little labels hanging to it.

Yea at length by thoſe little roundles we are led to the third kind of Spinal Veſſels, which are the Veins, into which all the boſoms immediately convey their burden, whereby they being continually emptied, may be ſtill able to receive freſh blood: wherefore the venous branch is ſtretched out by the ſeveral joyntings of the *Vertebræ* into the boſom, which preſently carries away the blood laid up in it, and to be reduced towards the Heart. The Veins deſigned to this office, after the example of the Arteries, are diſpoſed after one manner above the Heart, and after another below it. As to the firſt, a branch going from the Trunk of the *Vena Cava* below the Chanel-bone, or the firſt little Rib of the Breaſt, accompanies the Vertebral Artery, and aſcending by the holes of the Proceſſes between the ſeveral *Vertebræ*, inſerts a little branch to the Boſom, *Tab.* 13. *Fig.* 2. *h.h.h.* Then the top of this Vein being carried towards the hinder part of the Head, is continued into the Trunk of the Boſom, and opened by the other paſſage into the Jugular Vein. But further, as if theſe communications were not yet ſufficient for the draining away the blood, tranſverſe branches alſo are ſtretched out between both Veins, *Tab.* 13. *Fig.* 2. *i.i.i.* So manifold diverting places appear, by which it is enough and more than enough provided, leſt the blood might flow back towards the medullar Trunk upon any occaſion. Below the Heart, becauſe the Trunk of the *Vena Cava* cannot, as the *Aorta*, immediately lean upon the Spine, and carry ſhoots ſtraight to the ſame, therefore it ſends forth a Vein without a Companion, out of whoſe Trunk forked or twofold branches being ſent forth, go forwards both to the Muſcles of both ſides and to the Spine it ſelf. Below the Kidneys, ſeeing there is a ſpace granted for the *Vena Cana* to be carried nigh the Spine, the *Azygos* Vein ends, and from the Trunk of the greater Vein, as from that of the Artery, the Veſſels belonging to the Loyns immediately proceed.

Theſe things being lately obſerved concerning the blood-carrying Veſſels belonging to the Spine and the hinder part of the Head, and here inſerted in the place of an Appendix, ought to be referred to the other Doctrine of this kind, delivered above in the eighth Chapter. In the mean time, that we may return to our purpoſe, to wit, what remains of *Neurologie*, there is not much more to be met with worthy note concerning the Nerves: For they, as to the greater and chief Ramifications, are almoſt conſtantly both in Man and brute Beaſts, after the manner we have deſcribed them. Sometime it happens, although very rarely, concerning the divarications of the ſmalleſt Shoots and Fibres, that there is ſome variety: but as to the primary Veſſels, and thoſe drawn from them, the Configuration of every pair of Nerves is ſtill the ſame or alike in all. It now remains, that the Theory of the Nerves, hitherto drawn in words, and ſo only objected to the Underſtanding, may alſo be ſhewn to the Senſe, which will make it clearer. Wherefore we have taken care, that the ingraven Delineations of the wandring and intercoſtal pair of Nerves, and alſo of others which are of chief note, and of the Spinal Marrow it ſelf be plainly exhibited. The Figures of theſe, although taken from a dead Example, yet after many Diſſections and a frequent comparing them together according to their ſeveral parts, they are deſcribed as if from the life; the Lineaments of which with *Characteriſtical* Notes, that they may be the better and more diſtinctly perceived, and a large draught of every Figure, equal almoſt to the Scheme of Nerves in their animated Body, we have cauſed to be cut: further, becauſe the Contents of either ſide and of the Cavity between, cannot be at once deſcribed in their proper ſituation; therefore here it is ſuppoſed, That the *Spine*, with the oblong Marrow, or the whole medullar Stock, cut in the midſt is rolled out, and both ſides of it, with the pairs of the Nerves ariſing in the whole Tract, is turned outward.



The Ninth Table.

Shews the beginnings of the fifth and ſixth pair of Nerves, and the Roots of the Intercoſtal Nerve proceeding from them; moreover, the Origines and Branchings out of the ſame Intercoſtal Nerve and the wandring Pair, and of the acceſſory Nerve produced out of the Spine to the wandring Pair carried to the Region of the Ventricle. Beſides, here are repreſented the beginnings and diſtributions of the ſeventh, ninth, tenth Pair of Nerves, and of the Nerve of the Diaphragma; alſo the beginnings of the Vertebral Nerves in their whole Tract from the Region of the Nerves inſerted in the *Præcordia* and *Viſcera* are deſcribed, and their Communications with the former. All this whole following Table ſhews how it is found in Man different from other living Creatures.

A. *The Nerve of the fifth Pair with its two Branches* A. A. *the upper of which tending ſtraight forwards, diſtributes ſhoots into the muſcles of the Eyes and Face, into the Noſe, Palate, and the upper part of the whole Mouth; moreover, it reflects two ſhoots* a. a. *which are the two roots of the intercoſtal Nerve: the other lower Branches of the fifth Pair tending downwards, is diſperſed into the lower Jaw and all its parts.*

a.a. *Two ſhoots ſent down from the upper Branch of the fifth Pair, which meeting together with the other ſhoot* b. *reflected from the Nerve of the ſixth pair, conſtitute the Trunk of the Intercoſtal Trunk* D.

B. *The Nerve of the ſixth pair tending ſtraight forwards into the muſcles of the Eyes, out of whoſe Trunk a ſhoot* b. *which is the third root of the intercoſtal Nerve, is reflected.*

b. *The third root of the intercoſtal Nerve.*

C. *The Original of the hearing Nerves or of the ſeventh pair with its double Proceſs,* viz. *ſoft and hard.*

c. *The ſofter Branch of it which is wholly diſtributed into the inward part of the* Ear, viz. *into the muſcle lifting up the hammer, and into the ſhell.*

c. *The harder Branch of it, which ariſing whole without the Skull, and being inoculated with the ſhoot of the eighth pair* e. *conſtitutes with it a ſingle Nerve, which preſently is divided into many ſhoots: of which,*

1. *is beſtowed on the muſcles of the tongue and of the bone* Hyoides.
2. *Again into more ſhoots, the upper of which*
3. *Into the muſcles of the Face and Mouth.*
4. *Into the muſcles of the Eye-lids and Forehead.*
5. *Into the muſcles of the Ear.*

D. *The trunk of the intercoſtal Nerve conſiſting of the three aforeſaid Roots about to paſs into the Ganglioform infolding: which infolding of the intercoſtal Nerve, brough without the Skull, ſeems to be the higheſt knot.*

E. *The Original of the Nerve of the wandring or eighth pair conſiſting of many Fibres, with which the Nerve* 8. *ariſing out of the Spine, joyns, and being inoculated with them, paſſes together through the Skull, which being paſſed, it departs again, and having made a communication with ſome neighbouring Nerves, is beſtowed on the muſcles of the Shoulders and Back.*

e. *A ſhoot of the eighth Pair meeting with the auditory Nerve.*

f.f.f. *Other ſhoots of the wandring Pair going into the muſcles of the Neck.*

G. *The principal Branch of the ſame Pair being loſt or drowned in the Ganglioform infolding being near.*

H. *The upper Ganglioform infolding of the wandring Pair which admits a ſhoot* k. *out of another near infolding of the intercoſtal Nerve.*

h. *A branch out of the aforeſaid infolding of the wandring Pair going into the muſcles of the* Larynx, *a noted ſhoot of which entring into the Shield-like Cartilage, meets with the returning Nerve, and is united to the ſame*

i. *A ſhoot ſent from the cervical Infolding of the intercoſtal Nerve into the Trunk of the wandring Pair.*

K. *The lower infolding of the wandring Pair from which many Nerves proceed for the Heart and its Appendix.*

l. *A noted ſhoot ſent to the Cardiack infolding.*

m. *Nervous Fibres diſtributed into the* Pericardium *and the Veſſels hanging to the Heart.*

n. *The left returning Nerve which being reflected from compaſſing about the deſcending Trunk of the* Aorta *upwards towards the Scutiform Cartilage, imparts in its aſcent many ſhootr* **** *to the rough Artery, and at length meets with a ſhoot* h. *ſent from the Ganglioform infolding. This returning back from the knot of reflection, ſends ſome ſhoots towards the Heart.*

L. *The returning Nerve in the right side, which being reflected much higher, binds about the axillary Artery.*

O. *A noted branch sent down from the Trunk of the wandring pair in the left side towards the Heart, one shoot of which presently becoming forked, compasses about the Trunk of the Pneumonick Vein; the other attaining the hinder region of the Heart, is dispersed into many shoots which cover over its superficies: a like Cardiack branch sent out of the Trunk of the other side, meet with this.*

p. *The shoot of the aforesaid branch going about the Pneumonick Vein.*

q. *Another branch of the same imparting to the Heart many shoots which cover over its hinder superficies, turned back beyond their proper situation.*

r.r.r. *Small shoots sent out of the Trunk of the wandring pair which are inserted by a long tract to the* Oesophagus.

S.S.S. *Many shoots cut off, the branchings of which being distributed into the substance of the Lungs, variously straiten and bind about the blood-carrying Vessels.*

T.T.T. *The Trunk of the wandring pair divided into two branches,* viz. *the exterior and the interior, either of which inclining towards the like branches on the other side, are united to the same, and after a mutual communication constitute the two Stomachical branches,* viz. *the upper and the lower.*

V.V. *The inward branches, which being united in* X, *constitute the beginning of the lower Stomachical branch.*

W.W. *The outward branches, which being united in the Figure to be added to this, make the upper Stomachial branch.*

X. *The joyning together of the inward branches.*

F. *The beginning of the Nerve of the ninth pair with many fibres, out of which being united, a Trunk being made is carried towards the tongue; but in its progress sends out two shoots.*

Θ.Θ. *The first shoot tending downward, and united to a branch of the tenth pair, is bestowed on the* Sterno-thyroeidal *Muscle.*

Θ.Θ. *The second shoot on the Muscles of the Bone* Hyoides.

Θ. *The Trunk of this Nerve passing into the body of the tongue.*

G. *The upper Ganglioform infolding of the intercostal Nerve, which is the highest knot of this Nerve, being come out of the Skull.*

α. *A shoot out of this infolding sent into the neighbouring infolding of the wandring pair.*

b.b. *Two nervous Processes by which this infolding communicates with the Nerve of the tenth pair.*

γ. *A shoot sent down into the* Sphincter *of the throat.*

Γ. *The middle or Cervical infolding, which being proper to man, is placed nigh the middle of the neck in the Trunk of the intercostal Nerve.*

δ. *A noted branch out of the second Vertebral pair going into this infolding, whereby this communicates with the Nerve of the* Diaphragma *in its first root.*

ε.ε. *Two branches from the same infolding into the Trunk of the Nerve of the* Diaphragma.

ζ.ζ. *Many nervous fibres coming from the Cervical infolding into the returning Nerve and into the Blood-carrying Vessels, and are also sowed into the Trunks of the* Trachea *and the* Oesophagus.

θ. *A shoot from the same into the Trunk of the wandring pair.*

χ. *Another signal shoot into the returning Nerve.*

κ.κ. *Two signal shoots sent down towards the Heart, which another branch* λ. *follows, arising a little lower: these being carried downwards between the* Aorta *and the Pneumonick Artery, meeting with the like branches of the other side, constitute the Cardiack infolding,* Δ. *out of which the chief Nerves proceed which are bestowed on the Heart.*

λ. *A branch proceeding a little lower from the intercostal Trunk, which is destinated with the former to the Cardiack infolding.*

Δ. *The aforesaid Cardiack infolding.*

μ. *The handle going from the same, which binds about the Pneumonick Artery.*

ν. *The lower handle binding the pneumonick Vein.*

Ξ. *The intercostal Nerve demersed into the cavity of the* Thorax, *where it binds the axilary Artery.*

ξ.ξ.ξ.ξ. *The four Vertebral Nerves sent down into the infolding of the* Thorax, *the upper of which binds the Vertebral Artery.*

ο.ο.ο. *Three noted branches sent down from the Cardiack infolding, which cover the anterior region of the Heart, as the Nerves* p. q. *going from the Trunk of the wandring pair, impart branchings to its hinder part.*

π. *The Vertebral Artery bound about by the Vertebral Nerve.*

ς.ς.ς. *Nervous shoots covering the anterior region of the Heart.*

τ.τ.τ *Shoots and nervous Fibres distributed to its hinder part.*

Ο. *The lower Infolding, called properly the Intercostal or Thoracical, into which, besides the intercostal Nerve, four Vertebrals are inserted: the uppermost of these in its descent binds about the Vertebral Artery.*

I. *The intercostal Nerve descending nigh the roots of the sides through the cavity of the* Thorax, *where in its whole progress it admits a branch from between the several knots of the* Vertebræ.

H. *The Nerve of the tenth pair, consisting of many fibres in the beginning, arises between the first and second* Vertebræ, *where presently it sends forth two nervous processes* b. b. *into the upper infolding of the intercostal Nerve.*

* *A branch of it, which being united to a shoot of the ninth pair, is bestowed into the* Sternothyroeidal *Muscle immediately lying on the rough Artery.*

□. *A shoot reflected into the posterior muscles of the Neck.*

△. *A shoot into the pathetick Spinal Nerve.*

• • • *Shoots from the chief branch of the same Nerve into the* Sternothyroeidal *Muscle.*

L. *The original of the chief Vertebral Nerve, which in this, as in all other Vertebrals, consists of many Fibres, one band of which going out of the lower margine of the Spinal Marrow, and another from the upper, meeting, go together into one Trunk, which is presently divided into nerves distributed many ways.*

ϱ. *A shoot from this Nerve into the branch of the tenth pair.*

c. *Another shoot into the Spinal Pathetick.*

c. *A noted shoot sent forth upwards into the muscles of the Neck and Ears.*

T. *A shoot from the crooked Nerve into the muscles of the Neck.*

7. *A Nerve from this pair into the first brachial nerve, out of which the nerve of the Diaphragma hath its highest root.*

M. *The beginning of the second Vertebral, out of which the upper Brachial branch proceeds, and in which the nerve of the Diaphragma is first rooted. This Brachial nerve in four-footed Beasts arises near the fourth or fifth* Vertebræ, *and so the root of the Diaphragma is placed lower.*

V. *The Vertebral branch destinated to the Arm.*

Y. *The Nerve of the Diaphragma, a shoot of whose root δ. comes to the Cervical infolding, and a little lower two other branches from the same infolding ε.ε. are reached out into its Trunk. This communication is proper to man.*

Φ. *The other root of the Diaphragma from the second and third Brachial nerve.*

χ. *The lower Trunk of the nerve of the Diaphragma being removed out of its place, which in its proper situation, passing through the cavity of the* Thorax *without any communication, goes straight forward to the Diaphragma, where being stretched out into three shoots, it is inserted into its musculous part.*

†.†.†.†. *The other Brachial nerves, out of whose roots nerves go into the intercostal Infolding.*

ω.ω.ω.ω. *The beginnings of the Vertebral nerves, from the several roots of which a branch is carried into the intercostal nerve.*

♄.♄. *The last beginning of the Spinal accessory Nerve, going to the wandring pair, beginning with a sharp point.*

♀. *The trunk of the same Nerve ascending, which in its whole ascent, going through the side of the Spinal Marrow, passes through the midst of the beginnings of the Vertebral nerves, and receives Fibres from the stock of the Marrow.*

♂. *The trunk of the same Nerve descending, which departing from the wandring pair, is reflected outwards, and after having had communications with the nerves of the ninth and tenth pairs, it is bestowed wholly on the muscles of the Shoulder.*

☽. *The lower process of the same Nerve.*

The Tenth Table.

Shews the beginnings and Branchings out of the ſame Nerves which were deſcribed in the former Table, as ſome of them are found in brute Beaſts otherwiſe than in Man.

A. *The trunk of the intercoſtal Nerve going out of the Skull.*
B. *The upper Ganglioform infolding ſpringing out of the trunk of the intercoſtal nerve.*
C. *The intercoſtal nerve ariſing out of the aforeſaid proper infolding, and ſent down into the other neighbouring infolding of the wandring pair.*
D. *A ſhoot from the upper infolding into the Sphincter of the throat.*
E. *Both the Nerves included in the ſame ſheath, as if they were the ſame trunk, deſcend towards the* Thorax: *out of which trunk appearing in this place, a branch is ſent out into the returning Nerve.*
F. *The lower infolding in the trunk of the wandring pair, or rather conſiſting in the common ſheath of either nerve.*
f. *A ſhoot out of this infolding into the Brachial branch coming between, in which branch the nerve of the Diaphragma hath its root.*
G. *The intercoſtal Nerve departing from the ſame infoldings, and going under the axillar Artery, is inſerted into the infolding of the* Thorax.
g. *Another Branch going between the two infoldings, and going above the axillary Artery, ſo that theſe two nerves having made an handle, bind about the Artery.*
H. *A noted ſhoot out of the aforeſaid infolding of the wandring pair into the Cardiack infolding.*
i.i i.i. *From thence many nervous Fibres are ſent down into the Veſſels belonging to the Heart, and into the Pericardium.*
k.k.k.k. *The greater Brachial nerves which are produced a lettle lower in Brute animals, than in Man: and therefore the nerve of the Diaphragma ariſes lower.*
L.L.L. *The Brachial nerves mutually cutting one another by the croſs proceſſes, communicate among themſelves.*
M. *The Nerve of the Diaphragma conſiſting of three roots, when in Man they are only two.*
1. *The firſt root of the ſame Nerve.*
2. *Its ſecond Root.*
3. *Its third Root, which communicates mediately with the infolding of the wandring pair,* viz. *by the trunk of the Brachial branch, to which it is fixed.*
n. *A Nerve carried from the ſecond Brachial branch into the intercoſtal infolding, which binds about in its paſſage the Vertebral Artery.*
N. *Shoots and ſuckers ſent down from both knots of the returning nerve towards the Heart and its Appendix.*

The other Nerves and their Branchings out are as in the other Figure, which ſhews the pattern of them in Man.

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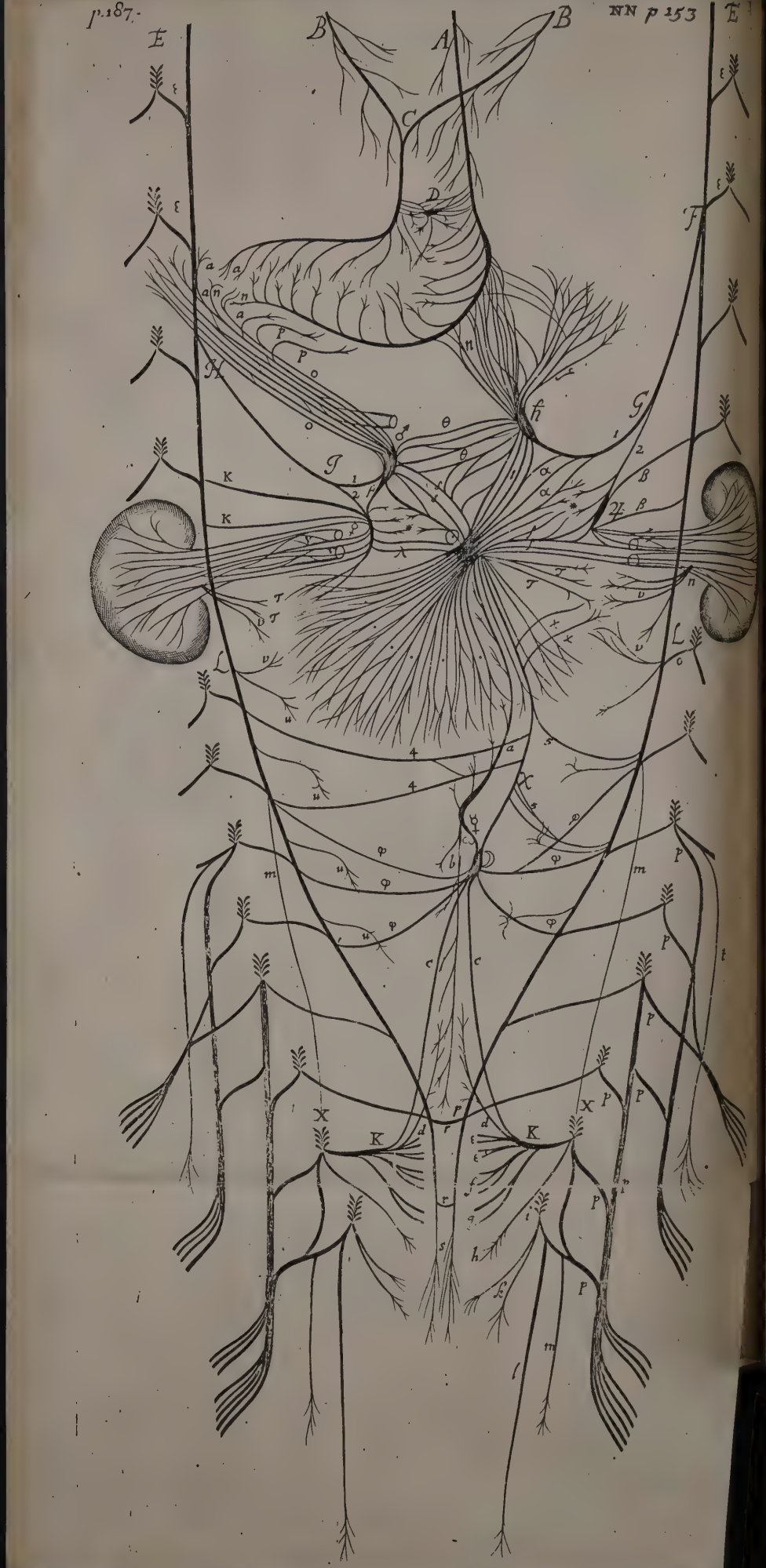

The Eleventh Table.

Shews the lower Branchings out of the wandring and the Intercostal Pair, distributed to the Ventricle and the *Viscera* of the Abdomen; also the beginning of the Vertebral Nerves, which are placed over against the former, and are ingrafted into some of them. The Figure of these in Man and in four-footed Beasts is almost alike, so that this Table may be common for both.

A. *The lower Stomachical Branch which is made up out of the internal branches of each wandring pair, being united together, and covering the bottom of the Ventricle, dispersés shoots on every side in the whole tract.*

B. *The upper Stomachical Branch which is made out of the external branches of the wandring pair, on either side united together, and creeps through the top of the Ventricle.*

C. *The Coalition or joyning together of the Branches.*

D. *The nervous Infolding out of the Fibres of both the Stomachical nerves, being united together nigh the Orifice, and as it were woven into a Net.*

a.a. *The ends of both the Stomachical nerves which there meet with the nerves of the Liver, and communicate with them*

E.E. *The Intercostal nerve descending on either side nigh the roots of the Ribs, and in its whole descent receiving a branch from the several Vertebral nerves ε.ε.*

F. *A branch going out of the Nerve of the left intercostal side, and sent down towards the Mesenterick infoldings.*

G. *The same Mesenterick nerve becoming forked, sends out the greater branch into the infolding, which is the Stomachical and Splenetick, and the lesser into that belonging to the Reins.*

H. *The like Mesenterick branch going out of the intercostal nerve on the right side, and inclining towards the Mesenterick infolding.*

I. *The greater Branch of this nerve becoming in like manner twofold, the greater branch going into the Hepatick and the lesser into the Renal infolding, or that belonging to the Kidney.*

♄. *The chief Mesenterick Infolding of the left side, which is also the Stomachical and Lienary, or belonging to the Spleen; out of which many little bundles of Nerves or numerous Conjugations are sent of many ways.*

♃. *The Renal Mesenterick Infolding of the left side, into which, besides the Mesenterick shoot,*

β.β. *Two other Nerves are carried immediately out of the intercostal nerve.*

γ.γ.γ. *From this Infolding, planted near the Bilary Chest, many Nerves and Fibres are sent into the Kidney.*

δ.δ. *Nerves and Fibres by which this infolding communicates with the greatest infolding of the Mesentery.*

ζ. *The chief bundle of Nerves tending out of the former infolding ♄. into the Spleen, which it having reached, reflects from thence certain Fibres into the bottom of the Ventricle.*

Π. *The second Conjugation of the Nerves from the aforesaid infolding into the bottom of the Belly, whose Fibres communicate with the shoots and fibres of the lower Stomachical nerve.*

θ. *The third Conjugation of Nerves between this infolding and the neighbouring Hepatick ♂.*

ι. *The fourth Conjugation of the Nerves between this and the greatest infolding of the Mesenterick ☉.*

♀. *The Renal Mesenterick Infolding of the right side, into which (as in its fellow) besides the Mesenterick branch.*

K.K. *two nerves are produced from the intercostal nerve.*

λ. *The Nerves and Fibres between this infolding and the greatest of the Mesenterick.*

μ. *A noted Branch between this infolding and the neighbouring Hepatick.*

ν. *A noted Company of Nerves and Fibres from this infolding into the Kidney, which climb over the emulgent Vessels, and variously bind them about.*

♂. *The superior Mesenterick Infolding of the right side.*

ο. *A great Conjugation of Nerves out of this Infolding into the Liver and Gall-Chest, out of which also many shoots are distributed into the Pylorus and Pancreas. The Nerves and Fibres of this, in its ascent towards the Liver, cover the Hepatick Artery, by making as it were a little Net, and almost hide its Trunk. The shoots of these meet with the tops of the Stomachical nerve α.α.*

π.π. *Shoots distributed about the Pylorus.*

P.p. *Other shoots dispersed into the Pancreas.*

ς. *Nerves reaching out between this Infolding and the greatest of the Mesentery. This infolding communicates with the neighbouring Renal by μ. and with the Stomachical by θ.*

☉. *The greatest Mesenterick infolding out of which a mighty bundle of Nerves ..... arising under the great Glandula of the Mesenterick, from thence is dispersed on every side about into many shoots and branches, and they are distributed into all the Intestines, except the straight Intestine. The Nerves and Fibres*

reaching out on every ſide, are knit to the Meſenterick Arteries and Veins in its whole compaſs, and variouſly ſtrain and bind them about.

τ.τ. *Nervous ſhoots from this Infolding into the Womens teſticles, or the uterine Glandula's, which meet with the branches of the Vertebral nerves of the twentieth and one and twentieth pair ſent into the ſame parts, and are inoculated with them.*

v.v. *The Vertebral branches into the Womens teſticles.*

☽. *The loweſt Infolding of the Meſentery placed much below the former, and having for its beginning three nerves on either ſide ariſing lower from the Intercoſtals.*

φ.φ.φ. *Three Nerves on either ſide ſent down from the intercoſtal nerve into the loweſt infolding of the Meſentery.*

χ.χ. *A Nerve ſtretched out of that Infolding directly into the greateſt infolding of the Meſentery, which in its paſſage receives on both ſides ſome ſhoots from the intercoſtal nerve,* viz. 4.4. 5. 5. 5. *and it ſelf ſends two ſhoots into the Women teſticles.*

ϟ.ϟ. *Two branches from the aforeſaid Nerve into the Women teſticles.*

♀. *Another ſmall Infolding ſtanding a little above this loweſt.*

ω. *A nervous Proceſs reaching out of the aforeſaid loweſt Infolding into the neighbouring very little infolding.*

a. *From the leaſt Infolding* ♀. *a noted nerve being carried into the greateſt infolding of the Meſentery, which in its whole aſcent ſtretches under the ſtraight Inteſtine and part of the Colon, and inſerts frequent ſhoots into them.*

b. *Another Branch ſent from the ſame Infolding downward, which ſtretches under the lower part of the ſame ſtraight Inteſtine, and imparts to it frequent ſhoots.*

C.C. *Two Nerves ſent downward from the loweſt infolding of the Meſentery* ☽, *which being ſent down into the Baſon about the loweſt cavity of the Belly, enter the two infoldings there,* K.K. viz. *one placed in either ſide.*

K.K. *A double Infolding placed within the Baſon, whoſe nerves provide for the ſeveral excretions there made,* viz. *of the Urine, Dung, and Seed; theſe ſend out nerves* d.d. *towards the loweſt Meſenterick infolding.*

d.d. *A nerve aſcending from the aforeſaid Infolding on either ſide, nigh the ſides of the ſtraight Inteſtine, inſerts ſhoots into it; which double infolding, another nerve deſcending* (b) *from the leaſt infolding, meets with.*

ε.ε. *Two Nerves from the ſame Infolding into the Womb.*

f. *A nerve from the ſame Infolding into the Bladder.*

g. *A nerve into the Glandules* Proſtatæ.

h. *A nerve out of the Root of the eight and twentieth Vertebral pair into the muſcles of the* Anus.

i. *The nine and twentieth Vertebral pair, from which*

k. *goes a Nerve into the Sphincter, and the other muſcles of the* Anus.

l. *A noted nerve on both ſides from that pair into the Yard.*

m. *Another ſhorter Branch into the muſcles of the Yard.*

L.L. *The intercoſtal nerve below the Reins.*

m. *A little nerve from the Vertebral branch into the Cremaſteral muſcle of a Mans Teſticles.*

n. *The one and twentieth Vertebral pair, the beginning of which being placed behind the Kidneys, lyes hid. From this Nerve very many ſhoots are ſent out on both ſides into the teſticles of the female Sex, which meet with other Meſenterick ſhoots, diſtributed to the ſame part.*

o. *A Nerve from the two and twentieth Vertebral pair, out of which alſo are ſome ſhoots ſent into the Womens teſticles.*

p.p.p.p.p.p.p.p.p. *Nerves deſtinated for the thigh, of which thoſe that ariſe higher, receive in their deſcent branches from the nerves ariſing lower.*

q. *The intercoſtal Nerves inclining mutually one to the other, near the beginning of the* Os Sacrum, *communicate by the croſs Proceſs* ⊣.

r. *Another croſs Proceſs within the crookedneſs of the* Os Sacrum *knitting together the two intercoſtal nerves.*

s. *Both the intercoſtal Nerves ending in moſt ſmall fibres, which Fibres are diſtributed into the very Sphincter of the* Anus.

t. *A Nerve from the twenty fourth Vertebral pair, which is carried into the inguinal Glandula's or of the Groyn.*

v.v.v. &c. *Shoots ſent down from the intercoſtal Nerve on both ſides into the body of the Ureters.*

x. *A Nerve which is deſtinated to the Teſticles and the Cremaſteral Muſcle, cut off where it goes out of the Abdomen.*

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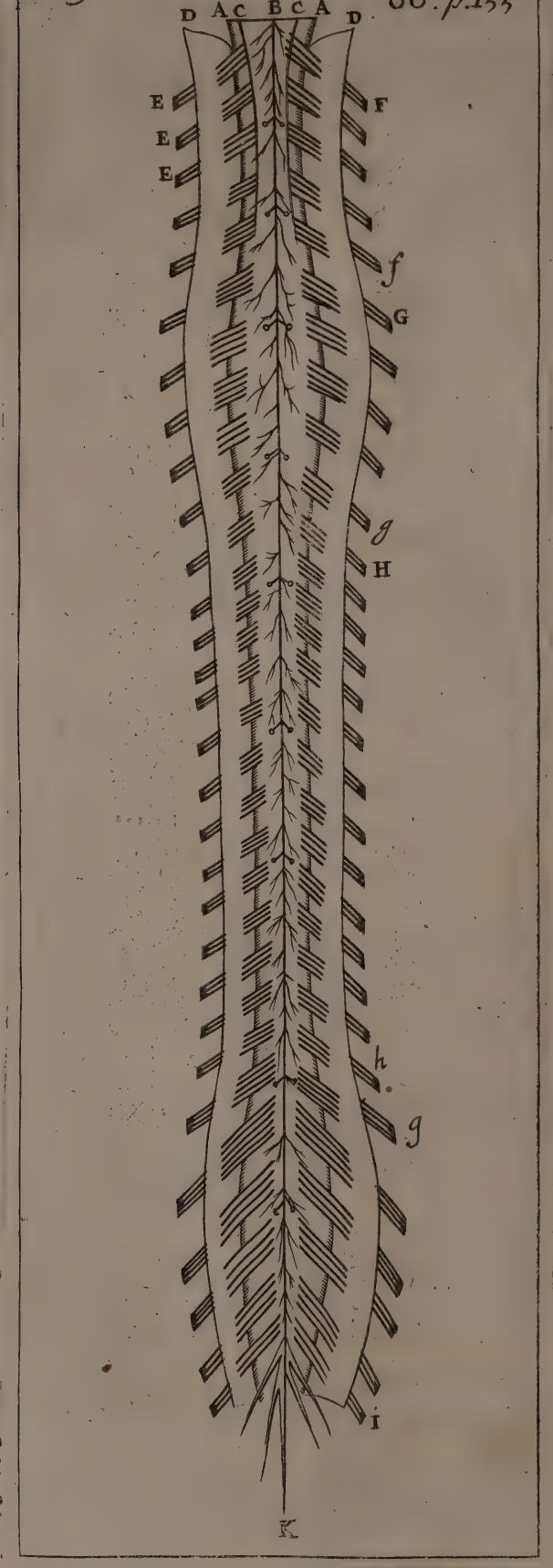

The Twelfth Table.

Shews the Spinal Marrow whole taken out of its bony Den, and half taken from the Membrane cloathing it, being dissected, that the beginnings and productions of all the Vertebral Nerves might be seen together.

A.A. *The top of the Spinal Marrow, where it is cut off from its cleaving to the oblong Marrow.*
B. *The Spinal Artery seen to descend through the whole Marrow, which however is made up of Arteries, brought into it from between the several joyntings of the* Vertebræ.
CC. *The Spinal Nerve coming from the fifth or sixth* Vertebræ *of the Neck to the beginning of the wandring pair.*
D.D. *Portions of the Membrane cloathing the Marrow dissected and rolled off.*
E.E.E. *The Spinal Nerves sent out of the upper margine of the Marrow by bands, with which the like bundles also being carried from the lower margine, meet and joyn together all into one trunk within the junctures of the* Vertebræ: *then being separated again without them, they are carried into their respective Provinces.*
F.f. *Nerves brought forth within the region of the Neck.*
G. g. *Nerves destinated for the Shoulder and Arm, where both the Marrow is larger, and the bundles of the Nerves are greater.*
H.h. *Nerves going out about the Back and Loyns: where both the body of the Marrow is again smaller, and the little bundles of the nerves are a little slenderer.*
I.i. *Nerves destinated for the thighs, where also the medullar Body and the little bundles of the Nerves are again larger.*
K. *Nerves going out of the* Os Sacrum.

The Thirteenth Table.

FIGURE I.

Shews the branchings forth of the Vertebral Artery reaching out on both sides into the superiour part of the Spinal Marrow, and into the hinder Region of the oblong Marrow.

A.A. *The Region of the posterior oblong Marrow.*
B. *The common passage made from both the Vertebral Arteries united together.*
C. *The Rhomboidal Figure, which in Brutes a double coalition of the Vertebral Arteries describes.*
D. *The first joyning together of the Vertebral Arteries above the Spinal Marrow, from which place the Spinal Artery descends.*
E. *The Spinal Artery.*
F.F. *Two Vertebral Arteries carried from the axillary branches.*
G. *The Spinal Marrow.*
f.f.f.f. &c. *Arterious shoots into the muscles of the Neck.*
g g.gg. *Shoots sent in the Spinal Marrow which joyn together from either side in the Spinal Marrow nigh the several joynings of the* Vertebræ.
h.h.h.h. *Arterious shoots, which following the chanels of the Bosoms, make the arterious Infolding, as it is described in the third Figure.*
f.f. *Two Arteries sent down from the* Aorta *into the Spine.*

FIGURE II.

Shews the Vertebral Veins which are Companions to the aboveſaid Arteries; alſo the upper portion of the Vertebral Boſom and the communications of either among themſelves and lateral Boſoms of the Head, and between the Jugular Veins

A. *The third Boſom of the Head cut off, where it paſſes into its lateral Boſoms.*
B.B. *The lateral Boſoms of the Head.*
C.C. *The round Den where the lateral Boſom goes on both ſides into the Jugular Vein.*
D.D. *The Jugular Vein.*
E. *The upper joynt of the Vertebral Boſoms.*
F.F. *The Vertebral Boſom on either ſide within the Skull brought through, and there paſſing into the lateral Boſom.*
G.G. *The Trunk of either Vertebral Vein brought from the* Vena Cava, *and there beginning.*
H.H. *Either Trunk of the Vertebral Boſom there cut off, which lower is continued through the whole paſſage of the Spine.*
h.h.h.h.h.h. *The joynings together on both ſides within the Commiſſures of the* Vertebræ *between the Vertebral Vein and Vertebral Boſom.*
i.i.i.i. *The Veinous paſſages, which reaching out before without the* Vertebræ, *are carried from the Vein of one ſide to its fellow of the other ſide.*
l.l. *The communication of all the Boſoms and Veins in the top of the Spine.*
k.k. *The Veinous paſſage from the concourſe of the Boſoms and Veins on both ſides into the Jugular Vein.*
l.l.l.l. &c. *The joynings together of the Boſoms of either ſide near the* Internodia *of the* Vertebræ.
m.m.m.m. &c. *The paſſages of the Veins carrying back the Blood from the Spinal Marrow into the Boſoms.*
n.n.n.n. &c. *The Chanels of the Veins carrying back the Blood from the muſcles of the Neck.*

FIGURE III.

Shews the Spinal Artery which is produced within the bony Den nigh the more inward Superficies of the Marrow, from the hinder part of the Head to the *Os Sacrum*, in the ſhape of a Net-work purſ.

a.a.a.a. *Arterious ſhoots ſent towards the Spine from the Vertebral Artery aſcending between the holes of the Spinal Proceſſes.*
b.b.b.b. &c. *Arterious ſhoots ſent from the* Aorta *towards the Spine.*
c.c.c.c. &c. *An Arterious ſhoot reaching out of every of the aforeſaid ſhoots into the poſterior Marrow.*
d.d.d.d.&c. *Another ſhoot reaching out of every of the aforeſaid ſhoots into the anterior Marrow.*
e.e.e.e. &c. *Every the aforeſaid Arterious ſhoots, as ſoon as carried into the bony Den becoming forked, ſend forth a little branch into either part, which on both ſides communicates with the next branch of the ſame ſide, and by the croſs Proceſs with the fellow-branch of the other ſide.*
f.f.f.f. *The joynings together of the Arteries of either ſide by the croſs ſhoot.*
g.g. *The Arterious ſhoots going out of the* Os Sacrum.
h.h. *Arterious ſhoots into the* Meninges *of the hinder part of the Head.*
i.i. *Arterious ſhoots going out of the Skull with the Nerves of the ſeventh pair.*
k.k. *Shoots reaching out into the wonderful Net, which in their progreſs are ingraffed mutually among themſelves, and alſo with the Arteries Carotides.*

FIGURE

Fig. III.

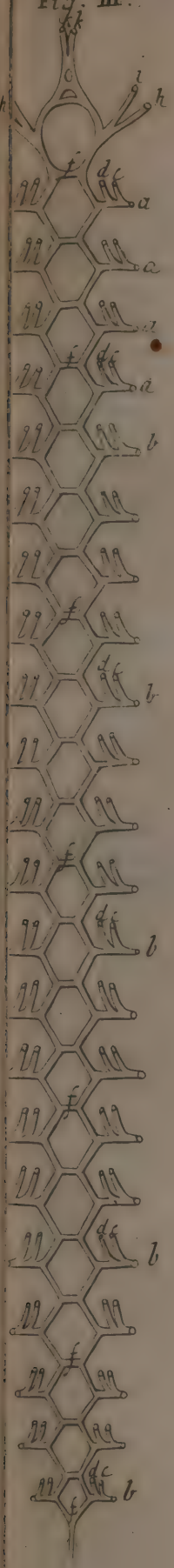

Fig. I.

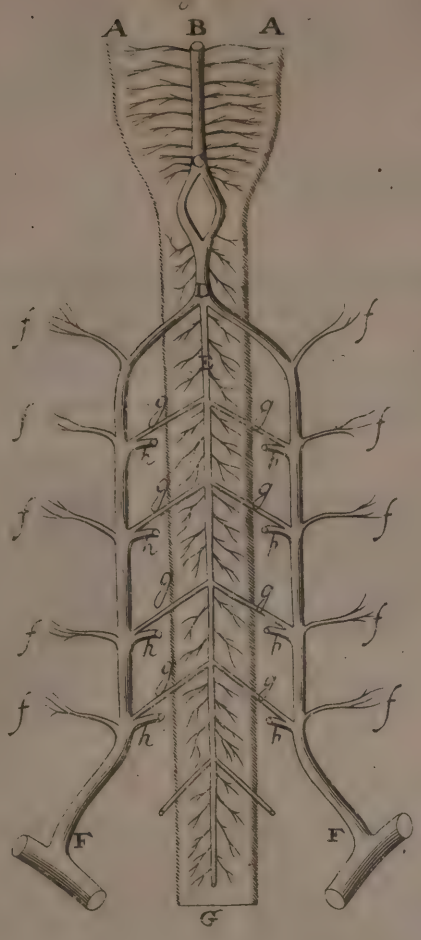

Fig. II.

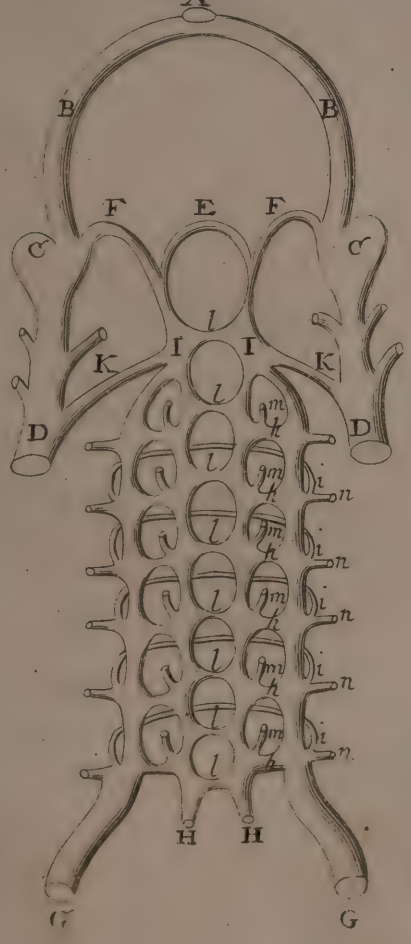

Fig. IV

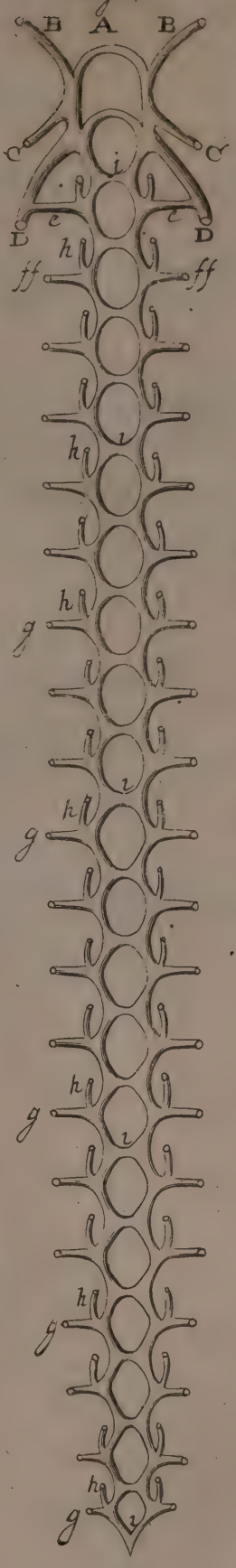

Fig. V

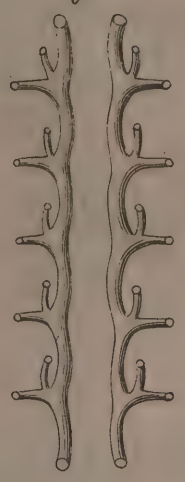

FIGURE IV.

Shews the Branchings out of the Spinal Bosom in its whole passage.

A. *The uppermost joyning of the Bosoms of either.*
B.B. *Chanels reaching out of either Vertebral Bosom into the lateral Bosoms of the Head.*
C.C. *Chanels brought from the common concourse of the Bosoms, and the Vertebral Veins into the Jugular Veins.*
D.D. *The Vertebral Veins.*
e.e. *A communication between the Spinal Bosom and the Vertebral Vein.*
f.f.f.f. *The passages of the Veins from either Bosom into the Trunk of the Vertebral Vein.*
g.g.g.g. &c. *The like Venous passages which are continued lower into the branches of the Vein* Azygos, *and lastly into the lumbary shoots of the* Vena Cava.
h.h.h.h. &c. *The Pipes of the Veins, which receiving the blood from the Spinal Marrow carry it back into the Bosoms.*
i.i.i.i. &c. *The commissures or joynings of the Bosoms of either side nigh the several joyntings of the* Vertebræ.

FIGURE V.

Shews the Image of the Spinal Bosom in a Dog, which hath not joynings together in its whole passage, as it is in a Calf, Sheep, Hog, and many others, but only in the lowest and uppermost part, where it communicates with it self by three or four cross Processes.

The

THE CONCLUSION.

THUS much for the Anatomy of the Brain and Cerebel, and of their Appendix, both Medullar and Nervous, and of the Uſes and Offices of all the ſeveral parts, of which we have largely treated. There yet remains, after we have viewed, not only the outward Courts and Porches of this Fabrick, as it were of a certain Kingly Palace, but alſo its intimate Receſſes and private Chambers, that we next inquire into, what the Lady or Inhibitant of this Princely place may be, in what part ſhe doth chiefly reſide, and by what Rule and Government ſhe diſpoſes and orders her Family. Then we ought to take notice, what defects and irregularities happen to it, or to its parts and powers; then to what injuries of changes or Diſeaſes this Building or Houſe, to wit, the Brain and nervous Stock, may be obnoxious. For indeed I am as it were bound, by reaſon of the Work it ſelf, and the promiſe I made before, that for the Crown of the Work, a certain Theory of the Soul of Brutes ſhould be added after the naked Anatomical Obſervations and Hiſtories of Living Creatures, and of their animated Parts. Truly it is but juſt and equal, that we enter upon this Diſcourſe of the Soul, and that other task of *Pathologie*, to wit, that the Aſperities and hard ſenſe of our already inſtitued *Anatomy* may be ſweetned with thoſe kind of more pleaſant Speculations, as it were cloathing the Skeleton with fleſh; and that the Reader being wearied by a long and troubleſom Journey, may be a little refreſhed and recreated. For in truth, whatſoever of our Work is performed without form or beauty, may ſeem as the Foundation of a Building only placed on the Ground, in which no elegancy or neatneſs doth ſhine, but that all things appear rude, and as yet built of rough and unpoliſhed ſtones. A Superſtructure indeed may be promiſed to be put upon this Foundation, perhaps fair and beautiful, whereby the minds of the Beholders may be pleaſed and inſtructed. But truly this kind of work may be too hard and great to be performed by our weakneſs; neither doth it become me to proceed in my undertakings, before theſe have undergone the Cenſure and chance to which they are ſubject. For I fear, leſt this Foundation, but now laid, ſhould become too weak and feeble for the ſuſtaining an higher Fabrick, at leaſt until this hath for ſome time undergone the tryal, by lying open to winds and ſtorms.

FINIS.

AN

ESSAY

OF THE

PATHOLOGY

OF THE

BRAIN

AND

Nervous Stock:

In Which

Convulsive Diseases

Are Treated of.

Being the Work of *THOMAS WILLIS* of *Christ-Church* in *Oxford*, Doctor in Physick, and *Sidly*-Professor of Natural Philosophy in that Famous Academy.

Translated out of *Latine* into *English*, By. *S. P.*

LONDON:
Printed by *A. M.* and *R. R.* for *T. Dring*, *J. Leigh*, and *C. Harper*;
1684.

The Authors Epiſtle Dedicatory,

To the Moſt Reverend Father in Chriſt, His Grace, Gilbert, *by Divine Providence Archbiſhop of* Canterbury, *Primate and Metropolitan of all* England, *and One of His Sacred Majeſties moſt Honourable Privy Council.*

IT is ſo Ordained by the Laws, moſt Noble Prelate, that whatſoever ſhall happen to be built upon any ones ground, it ſhall be his own by right of acceſſion. Since therefore, to that work which I lately attempted, concerning the Gifts and Nature of the Senſitive Soul, as alſo the Affections of the Brain and Nervous ſtock, and the various Diſeaſes which belong to them, I had placed the Anatomy of the humane Head for a foundation; it was altogether neceſſary (this Treatiſe being Dedicated to your Grace) that whatſoever building ſhould be raiſed on that Foundation, ſhould truly and rightly be ſaid to be yours: And ſo indeed, we continue the fault we had ſometimes Committed; and it becomes not only a ſtep, but what is more, an oligation to the following Crime; that at length, we ſeem rather to perform a Duty, the name of a fault being loſt, than to become Criminal.

But in the mean time, this matter in which I buſie my ſelf, may not be ſaid to be unfit for your Knowledge, or to be diſagreeing to the buſineſs of the Church, over which you moſt happily preſide; For both thoſe Epilepticks which are to be met with here, precipitating themſelves into the water or the fire, and thoſe whoſe members variouſly contracted and diſtorted with Spaſms or Convulſions, and thoſe whoſe whole Bodies ſo bent, that they could not ſtand upright; by and by, as if by Inſpiration of the Divil, they are agitated with Stupendious leapings, and other wonderful geſticulations: Theſe, I ſay, and many other Sick men whom I here every where deſcribe, ſeem not much to differ from thoſe whom we read of in the Evangeliſts to be cured by our Lord Jeſus Chriſt; and although ſuch be to be cured, however contumations and rebellious they are, the Phyſitian, however Skilful he be, ought always to implore the help of the Heavenly Power, to be aſſiſting to him, being above all the Strength of Medicines. Therefore, and by right the Diſeaſe by the Ancients called

Holy

tive part, suddenly and unfolded, are performed with such force, and strength, as the attraction of the muscle, in its motive endeavour, may exceed the force of a pully or windlace; and when this force only depends on the expansion or rarefaction of the Spirits, seated in the motive part, we conceive it to be no otherwise, but that the Spirits so expansed or stretched forth, as it were fired, after the manner of gunpowder, to be explodedor thrown out. But we may suppose, that to the spirituous Saline particles, of the spirits inhabiting the interwoven *fibres* in the muscle, other nitrous sulphureous particles, of a diverse kind, do come, and grow intimately with them, from the arterous blood, flowing every where within the same *fibres*: Then as often as the particles of either kinde, as *Nitre* and *Sulphur* combined together, by reason of the instinct of motion brought through the nerves, are moved, as an inkindling of fire, forthwith on the other side bursting forth, or being exploded, they suddenly blow up the Muscle, and from thence cause a most strong drawing together; for indeed it seems to be ordained for this end, that the Muscles are imbrewed much more plentifully with the arterous blood, than the membraneous inwards; to wit, that the Elastick coupling of the spirits, being consumed, and perpetually falling off, through the very often, and sometimes continual motion, might be by that means supplied, from the fresh sanguineous juice: in the mean time, that the spirits themselves, being supplied in a smaller quantity, through the small nerves, might even like old Soldiers continue longer in the same station, and follow their manifold coupling or labour. How else are labouring beasts supplied with a sufficient stock of spirits, for so much labour; whilst they exercise almost all their muscles, by a swift course for many hours, yea sometimes a whole day? or who can believe that a little handful of spirits brought through the small branches of the wandring and Intercostal pairs of the Nerves to the heart, can be able by their own strength to effect that its so strong and indiscontinued motion? Indeed it seems, that of necessity there must come to them from the blood perpetually, auxiliarie aid, and those afterwards to be always exploded. For this reason certainly, the motive virtue, both of the Heart, and the rest of the Muscles, becomes more strong and Elastick, above any mechanick Organ: to wit, for as much as the animal spirits, acting every where in the musculous stock, get to themselves an explosive *Copula*.

The Motion of a Muscle is a certain explosion of the spirits.

If any one shall be displeased at the word *Explosion*, not yet used in Philosophy or Medicine, so that this Spasmodick Pathologie, standing on this *basis*, may seem only *ignoti per ignotius explicatio*, an explication of unknown things by more unknown things; it will be easie to shew the effect of this kind of notion, and very many examples and Instances both concerning natural and artificial things, from the Analogie of whose motions, in an animated body, both regularly and irregularly performed, most apt reasons are to be taken. For besides the mixtures of *Nitre* with *Sulphur*, with *Tartar*, and with *Antimony*, all which are fired with a thundring noise; also *Aurum fulminans* or *fulminant Gold*, and a Composition of salt of *Tartar*, with *Nitre* and *Sulphur*, without any actual fire, being only thoroughly heated, are exploded with a vehement Crash; also to this may be referred, many Liquors, which being mixed together, or poured upon some certain bodies, cause or stir up violent motions, and plainly explosive: The spirit of *Nitre*, and the Liquor of congealed *Antimony*, being poured on one another, or either of them thrown upon the filings of Iron, cause a great *Ebullition*, with heat and black Smoke. It is commonly known, what heat or effervescency, and force plainly explosive, arise from fixed Salts melted together, and from acetous or sharp salt of every kind, mixed with one another: Nor is the effect of Explosion less seen, when a liquor imbrued with a volatile Salt, as the spirit of Harts-horn, or of blood, is put to a saline, either fixed or acetous *Stagma*, or sulphureous *Nitre*, to wit, the particles being vehemently stricken one against another, leap up with a force, and on every side are carried forth, a great way; which without doubt, if they were restrained within the space of any body, as the fibres of a Muscle, they would suddenly intumifie it, and so would constitute an instrument of local motion. Concerning this thing, we have more fully discoursed already in our *Neurologie*, or Tract of the Nerves, and perchance we may yet publish the explication of this more fully and more acurately some other time.

In the mean time that this opinion may not be thought altogether new, and that I have exposed it as a child of my own brain, that had no other Patron, I will here shew you the assertion of the famous *Gassendus*, which as it openly favours our Hypothesis, and in some sort gave an occasion of it; so, perhaps it will give to it some Authority. *Therefore this Rational man, weighing in his mind, how much that force or strength might be, with which not only the Arm, or Thigh, but the whole animal Machine, is moved, govern'd, lifted up, and carried up and down: He adds, Who can easily comprehend that small thing, whatsoever it is, within the body of an Elephant, whether we conceive it to be a soul, or spirit, or any other beginning of motion, that it should be able to agitate such a bulk, and to cause*

cause it to perform a swift and regular dance? and so much the more, for that, when as that small thing within that body, no longer flourishes, there is need of somuch outward strength to remove it never so little from its place: but indeed, the same fiery nature of the soul, serves within the body, by its own mobility, the same thing in proportion, that a little flame of Gun-powder does in a Cannon: whilst that it not only drives forth the Bullet, with so much force, but also drives back the whole Machine with so great strength. But indeed he says as to the spirits, which (like exploded Gun-podwer) cause the agitation, it is doubtful whether it be they which come from the brain, or those in the little tendons as it were of kin to them, or springing from them, that are thought to do it: But altho either of them concur, yet they seem to be more presently destinated to this office, which are those of the same kin or off-spring in the Tendons. There needs no more, it is declared, that the motive function depends on the *Elastick Copula*, of the animal spirits, and its decision or abating. But from this being supposed, (which indeed we may suppose with very great probability) it easily follows, that the convulsive motions proceed from the like cause: For whosoever shall consider the sudden puffings up, the violent and strong Contractions in the members and affected parts, yea, sometimes the most impetuous concussions, and violent throws of the whole body, can conceive no less, than that very many heaps of the animal spirits are exploded, or thrust out, even as lightning breaking forth from a Cloud. Further from hence it may be Argued by a reciprocal Argument, that because the Spasinodick motions are explosive, that therefore the regular are also produced by the explosion of Spirits: But after what manner, and by what means, and from what causes, the animal spirits being exploded, or thrust forth, produce Spasmodick Affections, shall be our present business, a little more largely and plainly to demonstrate, however difficult and abstruse the matter seems to be.

The Conjunct Cause of Spasms.

We will not here stand to recite many opinions of others, concerning the Nature and causes of a Spasm, or Convulsion; that which was most common, and long famous among the Ancients, that this distemper was only produced from repletion or inanition, or from fulness or emptiness, (however, besides the authority of *Hipocrates*, for the establishing of this, an example is brought, of a Skin, or the strings of Lutes, which are wont to be contracted, being either filled with a moist, or emptied by too dry an air) easily falls of it self; because it seems to suppose (that which is credible to none by Experience, the fragility of a *Nerve*) to wit, that the *Nerves* themselves, after what manner so ever *abreviated*, and contracted, are able with a certain force to draw to them the Muscles. If that it shall be said, that the repletion or inanition, ought to be understood, in respect of the solid parts, which were wont to be drawn together; it may be observed to the contrary, when as the Muscles and Nervous stock are very much watered with a watery humor, as in an *Anasarca*, or are plainly destitute of the same, as in the consumption, or Mirasmus; yet no convulsive motions are for that reason excited: among the moderns, very many have determined irritation of the Nervous parts to be the cause of Convulsion; taking their Conjecture from thence as I suppose; for that by ocular inspection it appears from the Vellication it self, and by the only touch of the Nerves, that spasms are induced: And indeed we have clearly observed in the dissection of a living whelp, that the knife being put upon the naked ends of the spinal Nerves, presently both themselves, and the Bodies of the Muscles in which they were inserted, were hauled: neither is it unusual, that spasms are excited almost in every man, by the punctures of the Nerves and Tendons. I remember by reason of an Ulcer in the arms of a certain man, that the Tendons of the Muscles were laid open, which when touched by the Surgeons Instrument, caused in the Patient a certain rigor through his whole body, and forthwith a Concussion arising, made him to quake for a good space. But in truth, albeit we grant the irritations of the Nervous parts, not seldom to serve the turn of the evident cause; and further that sometimes this solitary cause produces more light and transient spasms; nevertheless, that the more grievous paroxisms of this Disease, and their frequent repetitions by turns may be duly unfolded, it behoves us to investigate, or search out other and deeper causes, to wit, the conjunct and procatartick Cause.

Not repletion or fulness, or inanition or Emptiness.

Forasmuch as spasms never happen but in a living Body, where the Nervous parts are blown up, and grow turgid with the animal Spirit, we may readily conjecture that those animal Spirits themselves are as in regular motion, so also in the Convulsive, the next Instrument of Action: to wit, so long as they are imbued with a fit and moderate explosive *Copula*, and are moved to that striking forth, only by the command of the Appetite, or instinct of nature, they bring forth motions altogether regular; but if the same Spirits get to themselves an heterogeneous *Copula*, and too much Elastick, or if they are snatched into their Actions more impetuously and vehemently than they should be; they even like unbridled Horses, pricked forward with Spurs, leap forth inordinately, or throw off, or explode violently their *Copula*, altho genuine and natural: and so

There is a double Cause, and two kinds of Spasms. Irritation.

they carry away the containing parts, as it were a Chariot tied to them, together with themselves, with a fierce and perverse motion.

When therefore, as aforesaid, the Convulsive motions are chiefly stirred up for two Causes, hence as many *Species* of them are ordained. For first, it happens that a Convulsion is induced without a procatartick Cause, or heterogeneous *Copula*, first acquired only from a solitary evident cause: For so a vehement passion, impressed on the brain, a dissolution of the parts, hapning somewhere in the Nervous stock, a spasmodick passion is suddenly brought upon some, whose brain and Nerves are of a more weak constitution: for that the animal spirits do trouble the containing parts, the improportionate Object flying from them, and by striking vehemently their *Copula*, though very agreeing, it blows them up, and so they pull others annexed to them: Spasms being after this manner excited, because the natural *Copula* of the spirits in them is stricken more vehemently, they are after a manner explosive, which notwithstanding, quickly leave off, and very often pass away with moving of the Viscera, or Members; only with a trembling, and some horror, into a fainting of the spirits. But Secondly, Convulsions, whose paroxisms are more grievous, and stay' longer, or are oftener repeated, seem altogether to depend on a procatartick cause, or a previous disposition, and to arise from some other conjunct cause, besides Irritation. And therefore in this case we

A preternatural explosive Copula.

suppose, that the heterogeneous, and greatly explosive particles, do increase with the spirits, acting in this or that region of the Body: then from this wicked Combination, and restless Collision of this kind of matter, and the spirits frequent and vehement explosions being brought forth, the spasmodick Paroxisms are induced.

But besides the Elastick *Copula*, which every where happens to the spirits, from the arterous Blood, and from whose orderly explosion the motive force is performed, according to the Book of the Appetite, or instinct of Nature, in all the Nervous parts; (as we have elsewhere declared) also sometimes other kind of little bodies, of a fierce nature, or rather like *Gun-powder* or *Nitre*, come to the spirits, and intimately adhere to them, when frequent and suddain divorces of this matter, from the Embraces of the spirits, happen from the mutual striking together of the particles, the containing Bodies are variously blown up, and so are thrown into Convulsive motions. In truth, as often as the Spasmodick Affection becomes habitual, that the Convulsive Paroxisms arise not rarely on their own accord, and without any evident cause, but still on every light occasion; the procatartick cause of such a Disease, consists in the evil disposition of such a sort of animal spirits: For neither is the Serous filth, or other less sharp humours, although deposited in the very ventricles of the Brain, or about the origine of the Nerves, sufficient to stir up such a sickness: For that I have seen in the heads of dead people, oftentimes the middle part of the Brain, and the very beginnings of the Nerves, wholly covered with a limpid water, who, whilst they were alive, had neither the Epilepsie, nor Convulsive Motions: But to the producing of these motions, very active Bodies are required, such as are Saline, and Sulphureous, which being combined with the spirits, and then on a sudden breaking from them, they imitate the combinations and violent explosions of particular Minerals. For indeed, if in regular and ordinary motion (as we have intimated) the Muscles cannot get a motive force, and elastick strength, unless a certain explosion of the animal spirits be supposed, certainly much more lawfully may we assert, that epileptick fits, and other admirable Convulsions, which still happen to be excited, complications of the same spirits, with other very fierce particles, and vehement elisions, or strikings of these one against another, are required. But, as to this kind of Spasmodic *Copula*, because it differs from the natural and ordinary, which we have elsewhere shewn to be in regular motion, and to be supplied from the blood; it behoves us to inquire from whence it comes, and by what means and in what places it is wont to get to the spirits.

As to the first, it is to be observed, that Spasmodick explosions do every way happen, in the Muscles, to which only they are limited, which effect the regular motion; but also in the Membranes, to wit, the Ventricle, Mesenterie, and other parts almost without blood: besides, that the explosions themselves, in the Convulsive Affection, though they are excited contrary to the will of the Appetite, and the manner of Nature, are far more vehement, and do longer continue, than in the irregular motion:

The explosive Spasmodic Copula, *not immediately from the Blood, but from the Brain.*

out of which it seems to be manifest, that the Explosive Spasmodick *Copula*, doth come from some other place than the Effectrice of Legular motion: And indeed, it is probable, that that flows not, as this, from the arterous blood, running every where among the Musculous *fibres*, but descends from the Brain, with the Liquor watering the Nerves, and so is heaped up, about their beginnings, middle, processes, enfoldings, and Extremities, as it were the Mine of the Convulsive Disease. Indeed nothing

appears

appears more evident, than that the Spasmodick Disease doth most often arise by reason of the evil first fixed in the Brain, and from thence is transmitted into various parts of the Nervous System: for it happens from hence, that a vehement Passion, as of Fear, or Anger, or of Sadness of spirit, affecting the inhabitants of the *Encephalon*, the passion called Hysteric, and Hypochondriac, doth so often arise: Further, that in the evil Crises of Fevers, when the adust recrements of the blood are transfer'd into the head, Convulsions do generally succeed. Moreover, and this is the reason, why the Vertigo, the inflation of the head, torper of the mind, and other accidents of the Supreme Region, are wont to be the *proœmium* of Spasms presently following in the Inwards, and not seldom in the whole Body. Wherefore it is not to be doubted, but that the heterogeneous and explosive particles, are instilled from the Blood, together with the Nervous juice, into the Brain; which afterwards being thrust forth into the Nervous stock, do there grow to the spirits, and with them bring on a Convulsive disposition. In truth, the Spasmodick distempers, which are either universal, or at least occupy many parts of the Body at once, arise for the most part, by this only means. But in the mean time, we will not deny but that particular Spasms, which contain themselves within certain places, the dead being no ways affected, are induced sometimes by other means. For if the Nerves imbibe their humour from either end, to wit, the root, and the extream fragments, (which both the learned *Glisson* maintains to be most likely, and by us is shewed in our Neurologie, not without great probabillity) it may be from hence inferr'd, that the Spasmodick particles are brought inwardly, not only from the beginning of the Nerves, but somewhat also by their extremities: Therefore that perhaps appears clear and plain enough, that from the Spleen being evilly affected, Spasms arising about its Region, do not seldom affect the *Hypochondria* and *Præcordia*. I have known some, from a Tumour or Ulcer existing in the Mesenterie, Womb, and other inwards, were wont to have Convulsions both in the grieved part, and also all about it; the reason of which seems to be no other, than that the heterogeneous particles being more plentifully heaped up in the affected place, creeping also into the Nervous *fibres*, planted nigh thereunto, supply them with matter for Convulsive motions like to fired Gun-powder: But indeed, Spasms arising from such a cause, are not wont to diffuse themselves far about, nor always to ascend to the Head.

Sometimes received from the ends of the Nerves.

These things being thus premised, concerning the inward and next cause of the Spasmodic Distemper, which we affirm to arise chiefly, and most often from the head it self, and in some respect also from the extremities of the Nerves; it now remains, that we more particularly declare, the various remoter Causes in either kind, and the manifold provision of this Disease. The Convulsive Disease therefore, for the most part, takes its Original from the head: to wit, as often as the heterogeneous and explosive particles, being diffused from the Blood into the Brain, or its medullarie Appendix, are afterwards derived to the Nervous stock, and there grow together with the spirits: But this happens to come to pass from various causes: for there are very many ways and means whereby the Morbifick matter is admitted into the head, and very many also, whereby it is deduced into this or that region of the Nervous System; and according to the various Translations of this kind of morbifick matter, the divers kinds of Convulsive motions are constituted.

The more remote causes of Spasms.

Therefore, that the Heterogeneous and Spasmodic particles are admitted into the Encephalon, it is to be imputed to the fault both of the Blood sending, and of the Brain receiving it.

1. When the Blood pours upon the Head the Morbifick matter, either all its whole mass is depraved, as it frequenly happens in malignant Fevers, also in the Scorbutick, Cacochymick, and chiefly in an Originally corrupt Distemper; or the Blood of it self innocent and incorrupt, receives elsewhere Malignant little bodies, and afterwards fixes them on the brain; so in great impurities of the Inwards, and chiefly when any parts are affected with an inflamation, or virulent Ulcer, or hurtful Ferment; for from such Mines the taint of the Disease, the noxious particles, bubble up into the Blood, and afterwards, in its passage, are laid up in the Brain: So, by that reason the Spleen, Womb, and other Inwards, being evilly affected, Convulsive Diseases are excited, which notwithstanding, depend more immediately upon the Brain, receiving the corruption of those parts, through the commerce of the Blood.

1. The morbifick matter is heaped up within the Head, by the default both of the blood sending.

2. But in the second place, the Blood however vitious it should be, and impregnated with the Morbid seed, it could not easily leave its infection on the head, unless there were some fault in the constitution of the Brain, and its Appendix; as long as these parts are well made, and are full of vigour, they defend themselves, and what belongs to them; and the doors being shut, they admit nothing but an unmixt spirituous Li-

And also of the Brain receiving it.

quor,

quor destinated for their use: but if either the passages and pores of the Brain are too lax, or the door-keeping spirits leave, or are called off from their watches, and Heterogeneous and Morbific matter creeps in together with the Nervous juice, and unfolds its malignity in the animal government. As to the evil disposition of the Brain it self, it is sometimes hereditary: So those sprung from Parents obnoxious to the Epilepsie, or Convulsions, are themselves for the most part prone to the same Distempers; and indeed, the constitution of the Brain may several ways become vitious from the birth: for either its temperature is more moist, or more dry than it should be, or it may be faulty by the excess or defect of either quality. Sometimes the pores are more lax, or its consistency is too soft, or too hard: and also the Conformation of the parts of the Brain, and its Appendix, may be after an undue manner; But sometimes, the disposition of the Brain and Nerves, originally whole and firm, is vitiated by accident, and acquires a Morbid inclination: long Intemperance may enervate these parts: as also Malignant Fevers, and Chronical Diseases, very much debilitate them: besides outward accidents, as the excess of heat or cold; an Ulcer or a blow oftentimes perverts their Crases, and renders them more incident to the impressions of Diseases. But as to the constitution or irregularities of the animal spirits, by reason of which, the Heterogeneous and Spasmodic particles enter the Brain without any repulse, and more easily cleave to it; it is to be observed, that the animal spirits are in some more tender, and easily dissipable from their very birth; so that indeed they are not able to suffer any thing very strong or vehement to be brought to the sense or imagination, but straight they fly into confusions: For this reason, women more than men, and some of them more than others, are obnoxious to the passions called Hysterick. Further, sometimes a violent Passion impresses on the spirits, though moderately firm, this kind of dissipation and inordination, so that afterwards they are able to suffer nothing strongly, or to resist any injury: So it often happens, that Morbid impressions are affixed on the animal *regimen*, by sudden fear, or great sadness, which can hardly ever after be blotted out: for from hence Women often contract first the Diseases named the *Mother*, or from the *Womb*; and Men the *Hypochondriack*, and are for the most part still subject to them.

The evil disposition of the brain is either hereditary,

Or acquired.

From these things it appears, after what manner, and for what causes, the Spasmodic Matter is wont to be admitted into the Head: now let us see next what is done with it afterwards; if that this matter brought to the Brain, induces the Convulsive Distempers, either not always, or not altogether after the same manner.

2. *How the Morbific matter being admitted within the head is disposed.*

1. It sometimes happens, that the Heterogeneous and Explosive Particles are admitted into the Brain, which notwithstanding are again exterminated without any great hurt, and before they enter into the Nervous stock: for that the Veins and Lymphducts, or water-carrying Vessels, often sup up what is superfluous, and an enemy to the animal dominion, and convey it forth of doors, or dispose of it into Emunctuaries, or Sinks. Whilst such a Matter is for a little while agitated in the Brain, its Particles being affixed to some of its Spirits, and at length striking against them, cause the *Virtego*, and the swimming in the head; but because they enter not into the passages of the Nerves, Spasmodic Distempers do not follow.

Sometimes it is carried back again from the brain.

Sometimes it is thrust out into the Nervous stock.

2. When the Morbifick Matter is admitted within the Head, and not presently from thence sent back, oftentimes it produces not its evil, till it is inserted into the stock of the Nerves; for the animal Spirits within the Brain, being as yet strong, and having got a more free space, they evade the embraces of every Heterogeneous *Copula*; which indeed they are not able to do within the strait channels of the Nerves: Besides, the Morbifick Matter it self, if it cannot be sent away out of the Brain by the excretory Vessels, it is by and by sent forth to the System of the Nerves, as the more ignoble part; but if in spite of the force of the superior faculties, such a matter stays long within the Brain, it much infects the spirits that inhabit it, and induces the *Epilepsie*, as shall be more particularly shewed hereafter: but more often, the hurtful matter is thrown on the Nervous stock, from the Brain, without much harm to it; but this happens to come to pass not always after the same way.

Remaining in the brain causes the falling-sickness.

The Spasmodic matter being fallen on the nervous stock.

For truly, the Heterogeneous Particles, being mixed with the Nervous Liquor, and fallen towards the beginnings of the Nerves, do not indifferently enter all of them together, or these, or those, as chance shall guide them, but they are directed to the passages of some before others, and that not without some Reason. For we observe, that the Convulsive Symptoms do chuse for the most part one place in Children, another in riper years, and a different one in more tender, than in the more robust.

In

Afflict the fore-parts of the Nerves in Children.

In Children, who are not yet accustomed to the Affections of the Heart, and exercise of the outward members (whereby the Morbifick cause may be further carried from the brain) the Spasmodic matter runs more often into those neareſt Nerves, *viz.* the third, fifth, and sixth pares; wherefore, their faces and mouths, and those parts, are chiefly handled: and it is rare and unusual for them to have their *viscera*, and *præcordia*, lifted up, or affected, with an inordinate motion, as in those of riper years: on the contrary, in men of more advanced years, by its approach to the intercostals, and the Nerves of the wandring pare, it being more open to those of the spinal marrow, which those Nerves respect, are wont to be more frequently pulled: but yet with this difference, that in the more tender, and those who are very delicate, and subject to passions, and who by reason of the passions of the mind, have very often their *præcordia* and *viscera* disturbed, the Spasmodic matter more readily enters the more open passages of the interior Nerves, and therefore they are rendred more obnoxious to Spasms, stirred up in the *Abdomen* and the *Thorax:* for hence it is that Women are molested with the Passions called Hysterical, and some men with the *Hypochondriack*; as shall be more largely declared hereafter, when we come to treat particularly of these Distempers.

Otherwise in those of riper years.

After what manner it disturbs the spirits, whilst it stays near the beginning of the Nerves, or being fallen more deeply into their passages.

When the Spasmodic matter falls upon the heads of some Nerves, or remaining there, it creates only a giddiness, and lighter *Spasms*, and leapings of those parts to which these Nerves belong, or being slidden more deeply into the pipes of the Nerves, it brings forth more cruel Convulsive Paroxisms: but the same being dilated into the Nervous processes, is disposed through one or more of the branches of the stock or trunk, sometimes all, and sometimes only those more open than the rest, and by degrees cleave to the spirits, both within those Nerves, as also to those planted within the hanging *Fibres:* so that it is after the same manner, and there is the like preparation in the disposition to Convulsive *Paroxisms*, as if grains of Gun-powder were laid in a long train to be fired successively: The spirits after this manner imbred with an Heterogeneous *Copula*, are lodged within the *Fibres*, interwoven with the Membranes and Muscles, but chiefly within the Nervous foldings; and when they grieved with too great plenitude, or troubled on any other occasion, are compelled to shake off their *Copula*, the Particles striking and leaping one against another, hugely blow up the containing parts; and so excite a motive force, contrary to the commands and laws of the Appetite and Nature: Besides, the spirits once stirred up to the performing Convulsive motions, begin their Explosions from the one or the other extremity of the Nervous System; but for the most part at the end. But they who are first explosed snatch or take with them their neighbours, also prediſposed like a fiery train; and so they propagate the begun affection, with a long continued *series* of Spasms, from one end to the other: For a Convulsion begun in the bottom of the belly, or at the foot, or hand, creeps by degrees to the upper parts, and for the most part to the head it self: and the same Distemper when it begins in the brain (as in the Epilepsie) is derived in like manner thence downwards, to the remote Viscera, and also to the exterior Members and Limbs.

The spirits enter into explosions, by reason of plenitude or irritation.

The Spasmodick matter causes Convulsions, either continued, or periodical, or by fits.

The Morbifick matter, flowing in the heads of the Nerves, produces divers kinds of convulsions, according to their various plenty and dispensation; For first of all, it is to be observed, that the whole passages of the Nervous System, or of some of its parts, through the abundant and exuberant matter, are sometimes possessed, so that the animal spirits both flowing in, and there implanted, being full of an Heterogeneous *Copula*, and a perpetual supplement of it, are urged into continual Spasms. I have known some who have had all the Muscles and Tendons through their whole Body afflicted with contractions and leapings without intermission: I have known others whose Thighs, Arms, and other Members, were perpetually forced into various bendings and distortions: and also others I have seen, who of necessity were compelled to leap and run up and down, and to beat the ground with their feet and hands; and if they did not, they fell into cruel Convulsions of the *Viscera* and *Præcordia*. 2. If the Explosive and Heterogeneous Particles be combined with the spirits in a lesser plenty, they stick to them without tumult or perturbation, until, after some time, both Particles leaping again one from another, and from their striking one another, raise up Convulsive Paroxisms; which sort of Paroxisms are periodical, and are repeated exactly at certain hours; which happens by reason of the Morbifick matters being dayly poured upon the Nervous stock, with an equal dimension; and therefore about the same space of time it is also daily heaped up to an explosive plenitude; or they are wandring and uncertain in others, for that the Heterogeneous Particles are poured in with a lesser company, and so arise not to an explosive fulness under a long time; when in the mean time, the more full heaping of them together, and their explosion, are

are wont to happen sometimes more often, and sometimes more seldom, by reason of several occasions, or evident causes: hence it comes to pass, that the Spasmodic Distemper is sometimes altogether attributed to the evident cause; when indeed, if a more remote Convulsive cause had not gone before, such a cause had stirr'd up none.

The evident causes of Spasms.

Therefore, that we may say something of the evident causes of Convulsions, we have already observed, if they be more vehement, and happen to a weak and tender constitution of brain and nervous stock, they are sometimes solitary, or of themselves cause Convulsive Passions: but as often as the Spasmodic Distemper is heavier, and being made habitual is wont to return oftener, though the evident cause be manifest, and bears the blame of the effect, nevertheless it is to be suspected that a procatartick, or more remote cause exists, and is the more strong efficient, though it lies hid within; for unless the spirits are imbued with an Heterogeneous *Copula*, they would not be so easily nor so often driven into involuntary and preternatural Explosions.

The Evident Cause twofold viz. Filling and Irritateing.

We meet with a double order or *Classes* of Evident causes; for either they are of that sort which increases the procatartick or more remote, and brings it sooner to an explosive fulness, as are an ill manner of living, and errors in the six *non*-naturals, which by infecting the blood, and nervous juice, heap up to a Saturity, in greater plenty, on the Spirits heterogeneous particles, and by that means do the sooner procure Spasmodick accessions. Or 2dly, The evident cause is said to be, whatever stirs and irritates suddenly the spirits, that they presently fall into explosions, and whatever it be, that causes them to strike off their *Copula*, and of this sort there are very many accidents, that provoke the spirits, planted now within the Head, and now within the nervous System, to convulsive motions, by a divers instinct (as is wont in the regular motions) which motions are either direct or reflected.

The irritating cause stirs up Spasms, direct, or reflected.

1. Of the former kind chiefly are violent perturbations of the mind, wherewith the spirits of the brain being agitated and confused, they excite others lying within the nervous stock, and often prædisposed to irregular explosions; so a vehement fear, anger, or sadness, do not only introduce epileptical and hysterical fits, to those that are disturbed in their health, but sometimes cause to divers others, palpitation, and trembling of the heart, and also horrid convulsions of the members and limbs. 2. As to the other kind of evident cause, to wit, whereby Spasms are excited by a reflected Act, this indeed comes to pass not unfrequently, as often as any heavy trouble, with an irritation of the *fibres* and spirits, happens any where to the nervous stock: for that this trouble being by and by communicated to the chief fountains of the Spirits, to wit, the brain or Cerebell, from thence inordinare and violent motions, against the will of the mind, that is convulsive, being begun, they are returned back, for so either worms, physick, or sharp humours, cruelly hauling the coats of the intestines, cause spasms in those parts, and not seldom in the outward members.

So much for the several kinds of causes, the conjunct, procatartick, and evident, whereby convulsive Diseases, becoming habitual, and are wont to be repeated with more grievous Paroxisms, do arise: But as we have assigned another species of this Disease, where the Paroxisms depend on an evident solitary cause, or at most only from irritation, the Spirits being not yet præoccupied with an explosive *Copula*: it is now next to be inquired into, by what and how many ways this may come to pass. Concerning this in general, it is affirmed, that the Spasmodick fits produced by mere irritation, are either lighter and quickly passing away, or more grievous, and not seldom deadly, as when poyson is taken, or when they come upon an overpurging medicine. Moreover it is noted, when the morbifick, or irritative matter falls upon the tales themselves, or the foldings of the Nerves, that it also not rarely becomes explosive, and so Spasms produced also from mere irritation (as we have already noted) are certain explosions; these being thus premised, we will dispatch the business in hand.

The irritating Cause distinguished, as to the places affected, as to the subjects.

The irritation of the nervous parts, which is wont to cause convulsive motions, happens in various places, and from various matters, which are incongruous and inimical to the spirits, and *fibres*. As to the things, enemies to the Nature of the spirits, you may observe, besides poysons, and the excess of cangible qualities, which are inflicted from without; many things which are begot within us, *viz.* the various recrements of the blood, and nervous juice, feverish taints, preternatural salt, or sulphureous humors, yea worms, the stone, with many other things, to be infestous to the nervous stock, and ordinarily to stir up Spasmodick irritations. As to the places affected, or the seat of the irritative matter, although this brings hurt in any part of the nervous System, yet for the most part, it is wont to become most infestous, when it is fixed near the beginnings or the ends of the nervous System, or about the middle processes of the Nerves, and especially in their foldings: Besides, such a matter, which irritating the Spirits, is wont to have the place of an evident cause, doth not seldom become, as we hinted but now,

The places affected are the beginnings the extremities, and the middle processes, and foldings of the Nerves.

the

the means of a more remote cause, forasmuch as the heterogeneous particles, being sent from it, enter into the nervous fibres, and being combined with the Spirits, renders them more apt and ready to be exploded.

How the irritating Cause affects the origine of the Nerves.

1. Therefore, it sometimes happens, that malignant humours, and infestous to the nervous stock, being poured out from the blood, on the region of the brain, and from thence being dilated to the hinder region of the Head, do fall upon the *origine* of the nerves: where, if the little skin, which cloaths the oblong pith, be broken, they fall into the naked trunks of the nerves, and enter deeply into their fibres; wherefore indeed, *Convulsive motions* arise, not only in the neighbouring parts of the head, but sometimes in very remote, and not rarely in the whole Nervous System: This is generally observed in evil Crises of feavers, the morbifick matter being translated to the head; also in cephallic Distempers, being brought to the worst and deadly state. Truly when I have opened the heads of those who died by this means, I found in all of them the hinder region of the oblong pith, simmers'd with a sharp and salt *Serum*.

How the extremities of the Nerves.

2. As the interior extremity, or original of the System, so not rarely the exterior, or the end, from a vellication or hauling there made, begets Spasms or Convulsive motions, and transfers them on every side: that this is done ordinarily in the outward members, the prickings of the Tendons and Nerves do testifie. No less are Spasms wont to be excited every way about, from a vellication or pulling made in the *Viscera*, when at any time Medicines, or sharp humors, also Worms lying in the Ventricle or Intestines, pull the membraneous part, and so impress a troublesome sense on the chief sensories; presently from thence, by reason of the firing of the spirits, *Convulsive motions* torment now the affected parts, and now indifferently any other parts; for oftentimes Spasms, from the more grievous hurt of some inwards, do not only imploy the affected parts, and their neighbours, but also the Muscles of the Face and Mouth, and are likewise transfer'd to the exterior members. The stone impacted in the Uriters, causes not only cruel contractions in that passage, but in all its neighbourhood. Moreover, some Hysterick and other Hypochondriack symptoms, are sometimes induced by this means; forasmuch as by a vellication made in the Membranes of some *Viscera*, thence the Spasm is returned back.

How the middle processes and foldings.

3. The irritative matter, which is wont to be the evident cause of Spasms, sometimes occupies the middle processes of the Nerves, and therefore the parts, sometimes above, sometimes beneath its seat, are incited to Convulsive motions: This appears plain enough in the foldings of the Nerves; for when the sharp recrements of the Nervous juice, are laid up in them, they do not rarely create Spasms, through the whole neighbourhood: by this means the Collick or Hysterick Distemper, is often seen to be begot or excited, there being no fault in those inwards, only from the humors deposited in the foldings of the mesenterie, as we will shew hereafter, when we come to treat of those particular Distempers. In like manner, by reason that the ganglioform foldings being stopped up with a sharp and irritative humor, perfocation or choaking in the Throat, and various contractions of the *Præcordia* are caused. Besides, Spasmodick Distempers do not seldom depend upon a sharp humor within the whole trunks of the Nerves, and filling the passages of the Nervous Bodies. We have seen some troubled with admirable and perpetual Convulsions, so that they have been forced (as we have already mentioned) to run about, to leap, to fling about, and distort their members, to strike the ground with their feet and hands, and to exercise other strange gestures, even as if they had been bewitch'd; the genuine cause of which kind of passion, seems to consist in this, that the juice watering the Nervous stock, being most sharp, like stygian water, and being become degenerate from its due *Crasis*, doth irritate continually, and as it were possess with a certain madness, the spirits therein flowing and implanted.

The difference of Spasms in respect of their origine.

From these things which we have discourst about the various causes of Convulsions, their manifold *Species* and differences are made manifest. For first, we have made known, that Spasmodick Passions are most often derived in respect of their *origine*; for the head, being affected; or the Morbific matter flowing into the beginnings of the Nerves: yet sometimes, though more rarely, they depend upon such a matter creeping into the extremities of the Nerves.

Of their causes.

2. As to the production of the Disease and Symptoms, we observe the same sometimes to be produced from a solitary evident cause, as a sudden and vehement Passion: but indeed more often to require a more remote, or procatartick cause, or previous disposition: moreover, the causes sometimes so to interfere, that the procatartick also may supply the place of the evident cause; and also on the contrary, that this may serve in the place of the other.

3. As to the extension of the Disease, the Convulsive Distemper may be distinguished into *Universal*, because the spirits actuating the whole nervous System almost, and the *Encephalon* it self, are successively exploded; and *particular*, in which the spirits within some private region of the animal Kingdom are disturbed.

Of the extent of the Disease.

1. The former is meant when the animal spirits are irritated within their first fountains, to wit, the pith of the brain and cerebel, from whence their violent explosions happen; wherefore every internal function of the Soul, to wit, the sense and imagination, is obscured, and its exterior locomotive faculty perverted: This kind of universal Spasmodic Distemper, in which, besides the Spasms of the Limbs and *Viscera*, the interior powers of the Soul suffer an Eclipse, is again twofold, to wit, either primarie, which begins at the Head, and arises; forasmuch as the spirits inhabiting that place, being imbued with nitro-sulphureous Particles, are first exploded, and there inkindling, snatches or takes hold of the rest, flowing in both the medulary and nervous *appendix*, and there stirs up Convulsive explosions, as may be discerned in the Epilepsie.

2. Or this universal Passion, causing insensibility, is secondary, to wit, which being begun somewhere in the nervous stock; from thence plenty of spirits being successively affected, becoming like the undulation or moving of waters, is at length carried to the head it self: this often happens in Paroxisms called Hysterical, in which, by reason of the Spasm begun at first in the bottom of the belly, or some intumescency or rising up in the *Abdomen*, then the same spreading higher, with the same effect, through the pipes of the Nerves, the Ventricle, and by and by the *Præcordia*, are drawn together, and at length the Spasm forceably rushing to the Head, the Patients fall down, and all Knowledg is taken from them; and lastly, the Disease being reflected into other Nerves, Convulsive motions of the exterior members succeed.

2. But as to the particular Spasm, in whose fit the sick continue well in mind, this indeed is distinguished into various differences. As to the seat of the matter, which happens about the beginnings, extremties, or middle processes of the Nerves (as we have shewn) there arises a difference: For even as this Morbifick matter, besieging the beginnings of the Nerves, is fixed about the head, middle, or end of the oblong pith, it therefore happeneth that sometimes only the parts of the face, or mouth, sometimes the *Viscera* of the lower or middle belly; and again, sometimes chiefly the outward limbs are hauled together.

Of the duration of the Fit.

Further, a Convulsion, as to the duration of the fit, and its magnitude, uses to be distinguished into a continual and intermitting: The former, as we have already hinted, is called *Tenasmus*, or a permanent contraction; as when one part, or more, being contracted or distorted with a constant stretching, are detained for some time in the same preternatural posture; so when the Muscles, or a Member, suppose the Eye, Lips, Cheeks, are distorted from their right position, nor cannot easily be presently reduced: the cause of which is sometimes a resolution, or Palsie in some other Muscles, which when they are loosened, the opposite do too strongly act, and draw forcibly the whole part towards themselves, which ought to stand as it were betwixt them, in an equal ballance: but sometimes such a permanent contraction is excited, by reason of the Tendons being stopped with an impacted serous humor which become for that cause stiff: this kind of Distemper becomes very familiar in the Scurvey, that the sick sometimes are not able to extend any Member or Joynt, but they are contracted round like a Globe. Sometimes the Tendons in the back, by reason of such a course of humor, draw the bones out of their due situation, and cause a gibbousness, or bending out of the Body. The *Tenasme* is wont to be distinguished into universal; of which there are three kinds, to wit, *Tension* forward, *Tension* backwards, and *Tenasmus* properly so called; and peculiar or particular, which chiefly respects some certain Member or joynt: we will speak of these distinctly hereafter.

2. The intermitting Convulsion is either short and momentary, which is acted by frequent turns, and as it were by little leaps, as is to be observed in the quaking and shaking of the Tendons in horror, which are to be distinguished between with a frequent alternation of motion and rest: or the leapings of the Spasms, and their intervals, are drawn out longer; so it is usual for Convulsive Paroxisms, when they are repeated, to endure for some time, and to leave off again; but such periods are now certain, or come to certain set hours, now rare and incertain, and happen after a divers manner, and as various occasions are given. There are other differences of this Distemper, which will be better illustrated hereafter, when we shall speak particularly of each kind of Convulsions.

CHAP.

CHAPTER II.

Of the Epilepſie.

THus far we have treated of the nature, cauſes, and differences of Spaſms or Convulſions in general, according to a clean, new, and unuſual *Hypotheſis*; but (as I think) agreeable enough with Reaſon: our next buſineſs is, to explain particularly the chief kinds of that Diſtemper; amongſt which the *Epilepſie* eaſily deſerves the preheminence, and the conſideration of it ought to proceed by a certain right of method and order; for that this Diſeaſe having as it were got a large Empire in the human body, exerciſes its Tyranny not only in the whole *Encephalon*, but for the moſt part in all the parts of the Nervous Syſtem at once: wherefore by the Ancients it was called *Morbus Herculeus*, or the *Herculean Diſeaſe*, from the cruelty of the Diſtemper, and from the manner of the violent fits, as if ſent as it were by ſome Divinity, being ſo amazing; *Morbus Sacer*, or the Holy Diſeaſe; to which may be added, the conjecture of a certain Divine of our own Country, of no ſmall note, *to wit*, that many who were taken to be *Dæmonaicks*, or poſſeſſed with the Devil in the *New Teſtament*, were only Epilepticks; and that they called the cure of this Diſeaſe by our Saviour Jeſus Chriſt, an ejection or exorciſm of the evil ſpirit: In truth, in this Diſtemper, no marks at all of the Morbifick matter appears, or are ſo very obſcure, that we may have deſervedly ſuſpected it to be an inſpiration of an evil ſpirit; at leaſt it is probably, that as often as the Devil is permitted to afflict miſerable Mortals with his deluſions, he is not able to draw more cruel Arrows from any other Quiver, or to ſhew Miracles by any better Witch than by the aſſaults of this monſtrous Diſeaſe.

As the ſymptoms of the *Epilepſie* are very ſtupendious, ſo their cauſes, and the formal reaſon of the Diſeaſe it ſelf, are moſt difficult to be unfolded. For indeed, the buſineſs is variouſly controverted among Authors, both concerning the part affected, and alſo the manner of its being affected: many place its ſeat in the Brain, or its Ventricles; others in the meninges, or thin skins enwrapping the brain; and ſome again in the middle, or loweſt belly; but by what right ſhall be inquired into anon: In the mean time, laying aſide the Opinions of others, that the true ſpeculation of this Diſeaſe may be found out by the clew of right reaſoning, we will firſt of all endeavour to give you its deſcription, together with the whole ſenſe of its *Phænomenas*. Secondly, theſe things being rightly weighed, to find out the ſubject of the Diſeaſe, and its chiefly affected parts. Thirdly and laſtly, To add the means and manner whereby this Diſeaſe is begotten, with the true cauſes of its ſymptoms.

The deſcription of the Epilepſie, or the hiſtory of the Diſeaſe.

In the firſt place, As to the Idea of the Diſeaſe, the Epileptick fit or aſſault ſeems to be only an univerſal and more cruel Convulſion, to wit, in which the ſpirits inhabiting the Brain, being firſt irregularly moved, and as it were confuſed all the reſt dwelling in both the medulary and nervous appendix of the *Encephalon*, begin at once Convulſive motions, or inordinate contractions, and continue them for ſome ſpace, with frequent leapings or palpitations: The acceſſion of the Diſeaſe comes upon them at unawares, and oppreſſes the ſick, not the leaſt thinking of it; and in the twink of an Eye caſts them on the ground, deprived of ſenſe and underſtanding; for that they do not only fall, but are flung down with a certain force, ſo that oft-times the part firſt ſtriken againſt the Earth, or other adjacent bodies, is hurt with a bruiſe or wound; being laſt done, there comes upon them a gnaſhing of Teeth, with a foam at the Mouth alſo, oftentimes the ſhaking of the Head, and a frequent knocking it againſt the ground, the Arms and Thighs, yea, the hinder part of the Neck and Back either become preſently ſlit, or elſe they are diſtorted hither and thither, with various bendings; ſome cruelly beat their Breaſts; others ſtrongly thruſt out their Arms and Thighs, and fling them, and ſometimes the whole Body, impetuouſly here and there; many have their *Præcordia* and *Hypochondria*, and alſo all their lower Belly ſwelled and blown up very much: after ſome time, ſometimes ſhorter, ſometimes longer, theſe ſymptoms, the Tragedy being as it were acted, ceaſe on a ſudden, and then the ſick come to themſelves, and recover their ſenſes: but after the fit there remains an aking in the Head, with a dulneſs and hebitude of the ſenſes, and not ſeldom a turning or giddineſs.

The *Epileptick Paroxiſms* are wont to return ſometimes at ſet times of the day, month, or year; and moſt commonly at the greater returns of the Year or Tropicks, or at the oppoſite aſpects, or conjunctions of the Sun, or Moon, they are wont more certainly to return, and to afflict more grievouſly: ſometimes their comings or acceſſions are uncertain, and wandring according to the occaſion and variety of evident cauſes: there are alſo Fits or Paroxiſms, now more light, which quickly paſs away, ſo that the ſick are ſcarce thrown to the ground, nor are carried into diſorder or inſenſibility; now more grievous, whereby they when taken lie ſenſleſs the ſpace of an hour or more, and are tormented with horrid ſymptoms, as if poſſeſſed with the Devil: Sometimes tho more rarely, ſome foregoing ſigns of the Fit, warn them of their falling into it; as an heavineſs of the Head, a brightneſs of the Eyes, a tingling of the Ears: ſometimes a Spaſm or Cramp proceeds in ſome exterior part, as in the Arm, or Thigh, or elſe in the Back, or *Hypochondria*, which aſcending from thence like a cold Air, and creeping towards the Head, ſeems to bring on their falling down. Boys and young Men are found to be more obnoxious to this Diſeaſe than old Men, or Men of mature age: who ever are once ſtruck down by its fit, unleſs they be cured by the help of Medicines, they will hardly be altogether free from the infection of it all their Life after; the more often the Fits are, the more grievous they become; which as they frequently return, become more cruel, and enervate the uſe of the memory, imagination, and reaſon, and then the ſtrength and force of the whole animal function, until its Oeconomy being greatly perverted, the vital function at length decays, and by degrees is aboliſhed. The weapons and wicked preparation of this Diſeaſe, being after this manner laid open, we will next make an inquiry in what part it fixes its ſeat, or what is its next ſubject.

The ſubject or the ſeat of the Diſeaſe is inquired into.

The acceſſion of the Epilepſie, and the manner of invaſion, ſeem plainly to declare, that its primary ſeat, or part chiefly affected, is contained ſomewhere within the Head; but that a Paroxiſm ſometimes begins in the remote parts, and from thence aſcends towards the Head, which indeed ſeems only to be ſo, and happens by accident, when in the mean time the Morbifick cauſe ſubſiſts about the *Encephalon* it ſelf, (as ſhall be anon declared:) but that from the firſt aſſault of the Diſeaſe, preſently a ſtrange inſenſibility and diſorder, with contractions almoſt of all the Members and *Viſcera* ſucceeds, it is a manifeſt ſign that the whole joynting of the *Encephalon*, and the original of all the Nerves, are poſſeſſed with the Morbific cauſe: But truly, although it ſeem moſt difficult to unfold where this cauſe or morbifick matter ſubſiſts chiefly; for, neither is it probable that the ſame is diffuſed thorow all the parts of the Brain, yet it neither appears in what ſingular place this being fixed ſhould draw all the other parts ſo ſuddenly into a conſent of its evil.

Some affirm it the meninges or thin skins of the Brain; other the pith or middle part of the Brain.

Among the various opinions of Authors about this matter, there are two that ſeem more probable than the reſt, and challenge an aſſent with an equal likelineſs to Truth. One of which aſſerts the very middle of the brain; and the other the meninges, or the thin skins encompaſſing or cloathing it, to be the primary ſeat of the Epilepſie: The reaſon of the former is founded in this, that where the fountain of the animal ſpirits, and the original of the ſenſitive ſoul it ſelf conſiſts, there ought to be placed the cauſe of this Diſeaſe; certainly when the chief faculties are firſt hurt, all the reſt eaſily participate of the ſame evil: But in truth, though I may grant in the Apoplexy, and the *deliquium* or fainting of the ſpirits, that it is ſo, yet it follows not in a Convulſion (of which kind of Diſtemper the *Epilepſie* is) that all the *Fibres* and Nerves ſhould be pulled together, becauſe the middle part of the brain is firſt pulled: for that this, as it is a moiſt and fluid ſubſtance, and wanting of ſenſe and motion, ſeems not capable of contraction, or the Spaſmodic Diſtemper: wherefore others thinking the brain and every part of it, free from the blame of this Diſeaſe, caſt it altogether on the meninges: affirming, that the membranes, cloathing the brain, and chiefly their proceſſes, ſpread upon the clefts of the brain, and *Ceribel*, as they are hauled by the morbifick matter, do conceive or beget Spaſms or horrid Convulſions, and then that from the Meninges themſelves ſo contracted and brought together, the included brain is greatly compreſſed and bound together, ſo that its pores and paſſages being bound up, the great amazing diſorder and inſenſibility is induced, and alſo the trunks of the Nerves, to which either meninge or skin is faſtened, being brought into a conſent with them, enter alſo into Convulſive motions: And indeed after this manner the formal reaſon of the Epilepſie may perhaps ſeem to be unfolded; but truly when I conſider further of the matter, I think we may differ from this opinion, becauſe it does not appear by what courſe, or for what cauſe, the falling down being at hand, theſe meninges ſhould beget ſuch horrid Spaſms. Nay, it neither appears, how from them, however Convulſive they be, the Epileptick Paroxiſm ſhould be induced.

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As to the former, it seems an impossible thing, for the meninges to be so contracted, as to their whole Concavities, that being bound more strictly together, like a purse, they should on every side pull together their contents, and draw them into a narrower space: for that the *Dura Mater* sticks most firmly to very many places of the skull, yea, and the *Pia Mater* is tied to it, near the processes of the hollow turnings, by a mutual knitting of the membranes, and every where besides with a continuity of Vessels: hence it easily appears, either that membrane, as to the greatest part of it, is immovable, so that they cannot fall into so universal Spasms: but in respect of lesser Spasms, as when a certain portion of this or that meninge, or both together, is pulled, indeed we grant such may happen: for I have often heard those troubled with great headach to complain extreamly of a great constriction of the parts, lying under the side of the skull; sometimes on the right, sometimes on the left, and yet from thence no assault of falling down has followed: Further as those membranes being notably hurt, do cause great vellications or haulings, yet upon it there is not wont to be an Epileptick fit to follow: for I have known, from an Impost hume in the *Dura Mater*, when being broken and that the stinking matter had knawn the more tender meninges, and shell of the Brain, that the sick hath fallen into an amazedness, and at length into a deadly Apoplexy, who notwithstanding in the whole course of the Disease, was free from any Epileptical Symptom. Also I remember, I have seen one, who had the *Dura Mater* very much torn by the Instrument of an unskilful Surgion, and another that by a wound, had that with part of his skull taken away, so that a portion of the brain swelled forth, and yet to neither of them any Epilectical passion hapned; wherefore neither is it likely that the blood or humours, or (if any shall so argue) the vapours, compacted within those meninges, can bring in any greater evil than either a stroke or wound inflicted on them, or filthy matter there poured out: Besides, those who are more lightly troubled with the *Epilepsie*, so that they scarce fall down, and have their minds free through the whole assault of the disease, would perceive the membranes to be so contracted, and the globe of the brain to be more straitly thrust together, if there had bin any such kind of affection; but they on the contrary seem to have the brain as it were inflamed, and to be sensible, that the spirits leap forth, and are as it were explosed, with a certain fierceness.

It is affirmed, that the meninges are not first of all effected.

The spirits inhabiting the middle of the brain are the primary Subject of the disease.

As indeed, I think it is very likely so, that the Epileptick Paroxism is stirred up from a certain sudden rarefaction, and explosion of the animal spirits, inhabiting the brain, which are in truth the first and immediate subject of this Disease; to wit, whereby the Brain it self is inflated, and rendred so insensible, and the nerves hanging thereto, also put into Convulsions: For hence it comes to pass that the accession of this Disease begins so on a sudden, and determines perfectly without any great provision or remains of the morbifick matter; because the Infection is not brought so much to the solid parts, as to the spirits themselves.

We have already shown by what means, the heterogeneous and explosive *Copula*, consisting as it sems of *nitro sulphureous* particles, cleaving to the spirituous particles of the animal Spirits, and lastly, being smitten and explosed by them by reason of plenitude or irritation produces Convulsive Symptoms: But altho this kind of Spasmodick *Copula*, is first distilled from the blood into the brain, yet for the most part it does not take hold of the spirits there, or at least it stays not long with them in that place: but rather being thrust from thence towards the nervous *Appendix*, causes particular and respective Spasms, near the places affected: But sometimes if the spasmodick matter be more plentiful and strong, and the constitution of the brain weak, the heterogeneous *Copula*, being fixed to the Spirits, not only in the nervous stock, but also to those planted within the *Encephalon* it self causes the epilectick disposition; and the explosive particles of the Spirits, and this *Copula* knocking one against another, stir up the falling fit. For indeed, since the assault of the *Epilepsie* urging the insensibility, and great disorder, is for the most part the first Symptom, and all the pathognomick, it may be concluded that the Animal Spirits lying within the middle of the Brain it self, are affected before others; and that therefore that part is the principal seat of the disease: Then, forasmuch as the falling of the sick, or casting to the ground, and spasms of the members and *Viscera* most often follow that Insensibility great disorder, or leaping forth of the spirits, it follows that the animal Spirits also inhabiting the Nervous System, are imbrued with the same explosive *Copula*, and are drawn into consent with those inhabiting the brain it self, and are excited by them, to explosions purely inordinate; altho sometimes (by the whole *series* of Spirits, planted both in the brain and nervous stock, being like a long train of gunpowder, prediposed to explosions) an exterior Spasm, beginning a great way off, perhaps in some member or inward, may afterwards be carried to the Brain, as shall be more fully shown hereafter. In the mean time, it is concluded, that the region of the Brain it self is always the primary seat of this

this diſeaſe; and that we ought to ſuppoſe the conjunct cauſe of the diſtemper, not to be water heaped up within the ventricles of the brain, nor a thick or clammy humour, impacted in the paſſages of its pores: for ſuch cauſes are begotten by degrees, and therefore would ſhew ſome certain ſigns before hand, of the firſt coming upon one: further, the aſſault of the fit being over, ſuch a matter could not be wholly diſcuſſed in ſo ſhort a time, but that from its reliques ſome impediments of the animal function would remain, which indeed rarely happens in the Epilepſie unleſs inveterate: but, for the exciting of the falling down, no leſs can be imagined, than that the animal Spirits which flowing within the marrowie ſubſtance of the brain, perform the acts of the interior ſenſe of the imagination and appetite, having got an heterogeneous *Copula*, ſhould be inordinately exploded, and ſo they being diſturbed beyond their orders and ſtations, the ſuperior faculties of the animal regimen, muſt ſuffer an eclipſe; then, from this greater exploſion of Spirits as it were from a fiery enkindling, other Spirits inhabiting the marrowy and nervous appendix, being alſo prædiſpoſed to exploſions, conceive the like diſorder, and in like manner cauſe the exploſive convulſive motions of the containing bodies.

The diſeaſe affects ſecondarily very many parts of the Nervous Syſtem.

For altho we conclude, that the middle of the brain is always the primary ſeat of the Epilepſie, and that from the beginning, the morbific matter is laid up wholly in that Region; yet the diſtemper growing grievous, this being more plentifully ſpread thorow the head, enlarges its bounds, ſo that it being ſtrowed here and there, and far and near ſtretched out, Spaſmodick particles are caſt into the reſt of the Brain, and alſo into the nervous *appendix* like gunpowder or exploſive ſeed, whereby it comes to paſs, that at the firſt approach of that diſorder of ſpirits, convulſions follow ſometimes in theſe, ſometimes in thoſe parts, and not rarely thorow the whole body.

CHAPTER III.

The Differences of the Epilepſie, and the reaſons of ſome of the Symptoms are unfolded. Alſo its Curatory Method is repreſented.

THus far of the eſſence and the cauſes in general of the Epilepſie; it ſhall be now our next task to explicate the differences of this Diſeaſe, alſo the reaſons of ſome of the accidents and Symptoms belonging to it; to which we will laſtly add, Obſervations and Hiſtories of ſick people, with the method of curing.

The moſt notable difference of the Epilepſie, is wont to be taken from the Subject, to wit, that the brain or part of it, labouring with this diſeaſe, is either primarily, and idiopathetically or properly affected, or ſecondarily and not but by a conſent with other parts: concerning the former kind, we have hitherto diſcourſed as to the other, to wit, in which the falling down ſeems to ariſe from ſome place without the head, and then lays hold of it ſecondarily, and as it were by a blaſt ſent from elſewhere; it is to be obſerved, that this kind of diſtemper (as *Galen* hoth noted) proceeds either from the external or internal parts: we meet with many examples of Epilepticks, in whom the fit being juſt coming upon them, a ſpaſm is felt with a numnefs in the hand or toe, or other particular member, which preſently from thence as it were with a pricking or tingling, creeps towards the head, which when it hath attained, immediately the ſick party falls flat on the earth, and is hurried into inſenſibility and diſorder of Spirits, and other proper demonſtrations of the Symptome of the falling-ſickneſs; neither is it a leſs uſual *proœmium* of this diſeaſe, that there firſt ariſes as it were a conflict in the ſtomach, ſpleen, womb, inteſtines, genitals or other inwards: or that ſome kind of perturbation is raiſed in ſome of them; then from that place, the aſcent of (as it were) a cold air is perceived, to which diſtemper follows the acceſſion of the falling evil, with its moſt horrid proviſion of ſymptomes: hence it was commonly believed that the cauſe of the Epilepſie lay hid in the part, ſeen to be ſo primarily affected, and propagated its evil to the brain, of its ſelf innocent.

The Reaſon of the Epilepſie which is ſaid to be excited by conſent.

But in very deed, as to this we muſt ſay, that in every Epilepſie not only the procatartick or remoter Cauſe, but alſo the conjunct remains wholly in the brain: to wit, that the ſpirits inhabiting it, being diſpoſed to exploſions, and there being exploſed, bring on or cauſe

cauſe every falling evil. As to thoſe præliminary Symptoms in ſome epilectical people, they ſometimes have the place of an evident cauſe, and ſometimes only of a ſign: For when the evil diſpoſition of any inward, as the ſtomach, ſpleen or womb, happens with the diſpoſition of the Epilepſie, as often as any perturbation is begun in that diſtempered inward, it eaſily happens by reaſon of a tranſmiſſion of the ferment from thence, or a continuation of the ſpaſm to the head, an Epileptical fit is excited in the brain prædiſpoſed to act.

But theſe kind of ſymptoms of the falling evil, which being ſuſcitated from without ſeem to propagate the diſtemper to the brain, do often ariſe from the conſent of the brain it ſelf, and are only ſigns of the approach of the epileptical Fit, or of the ſpirits beginning to be exploded in the brain: For when the animal ſpirits planted in the middle parts of the brain and Cerebel, and alſo thoſe in the oblong pith or marrow, near the beginnings of the Nerves are ſo filled with an heterogeneous *Copula*, that for the caſting it off, they are ready to bring on the aſſault of the diſeaſe, before they are all exploded heap by heap, ſome ſpirits lying more outward in ſome private Nerves, becauſe they are deſtitute of the wonted influx of their ſuperiors, fall into certain inordinations, and ſo begin ſpaſms, which ſpaſms (as it it is often the manner in this kind of diſtemper) begin at the extremities or ends of the Nerves inſerted to this or that member or inward, from whence by degrees they creep forward to their beginnings; whither being come forth with the ſpirits thorow the whole *Encephalon* before diſpoſed to exploſions, being moved by that ſpaſms, and ſo being ſnatched away with a fiery enkindling, are ſuddenly exploded or thruſt out; ſo they ſeem to ſtir up the Epileptick Fit, beginning at firſt from themſelves as it were ſecondarily and by inſtinct, brought from ſome other place: After this manner, ſometimes the Hiſterical paſſions, when beginning in the bottom of the belly, they are communicated to the brain, are thought to ariſe from thoſe Viſcera, and to be ſtirred up by their fault; when in the mean time, the morbific cauſe ſubſiſts chiefly about the beginnings of the Nerves, as we have elſewhere ſignified, and ſhall again ſhow hereafter, when we come to treat particularly of the Spaſmodick diſtempers.

Other differences of the Epilepſie.

There yet remain other differences of the falling ſickneſs, to wit, that it is either hæreditary or acquired; again, either kind is variouſly diſtinguiſhed by reaſon of the Age or time, in which it firſt comes upon one, to wit, when the firſt coming of it happens before, or about the puberty or being of ripe age or after it; further as to the Efficacy of the diſeaſe into ſtrong and weak, for as much as the Paroxiſms or Fits are with, or without the diſorder of ſpirits, and falling as to its inordinate manner, whoſe aſſaults are wandring and uncertain, moreover it is wont to be diſtinguiſhed according to the peculiar Symptoms in theſe or thoſe ſick people, by reaſon of ſome diſpoſition, or manifold Idioſyncraſy, or propriety of the Temperament.

But from what has been ſaid before of very many of the ſymptoms, which are to be met with in this diſeaſe, the cauſes do eaſily appear, ſo that there will be no need here to conſider all of them: but of ſome of them, which ſeem more intrinſecate, it will not be from the matter to diſcourſe in this place.

Why Epileptick fall down with violence.

We will therefore firſt of all inquire, why thoſe ſick of this diſeaſe, do not fall as thoſe that are apoplectick, or have ſwounding fits, but are rather ſtricken down with violence againſt the Earth or any other bodies, that are by chance oppoſite to them, as if they were ſmitten down by ſome wicked Spirit, ſo that very often ſome part of the head, or face is hurt with the violent fall: And thoſe ſo diſtempered, even like the Dæmonaicks in the Goſpel, are frequently flung into the fire, or the water; but it may be here declared, that the Epilepticks become obnoxious to theſe kind of evils, for that the fit coming upon them, all knowledg or providence is taken from them; and further, the nerves neighbouring to the head, being ſtrongly contracted, the whole bulk of the body is carried away headlong: but in the Syncope and Apoplexie, the fall of the diſtempered body, ſeems as the ruines of a building, which happens by reaſon that its Props are taken away: but indeed in the falling Sickneſs, it is no otherwiſe than if a houſe were overthrown by the blowing up of gunpowder, which is removed much from the place where it ſtood.

From whence the Foam at the mouth of theſe troubled with the falling ſickneſs comes.

Secondly, It is commonly eſteemed a great Pathognomick, or Peculiar Symptom of the Epilepſie, if when the diſeaſed being fallen to the earth, and ſuffering moſt horrid Convulſions, there flows from the mouth, a ſpumous ſpittle or foam, which indeed is thought to be preſſed from the brain, being ſtrongly contracted into the Palate: But in truth, though it be granted that this flux of ſpume be very often a ſign of the falling Sickneſs, yet it is not ſo appropriated to this diſeaſe, but that the ſame ſometimes happens in the Apoplexie, in deep ſleep, in hyſterical diſtempers, and other convulſive diſeaſes: Beſides this kind of foam, does not deſcend from the Brain, for there is no paſſage open

open,by which it may paſs, but from the Lungs being inflated and elevated even to the Larinx, or the top of the ſharp Arterie, from whence ſpittle foams forth, with a certain fervency and ebullition: For the fit of the falling evil growing urgent, when moſt of the Nerves in the whole Body are drawn together, thoſe alſo that ſerve for the motions of the Lungs and Diaphragma, ſuffer moſt cruel Convulſions, and liſting up all the *Præcordia* upwards, continue them almoſt immovable, in a long Syſtole, ſo that the breathing, and pulſe, cannot be at all perceived; In the mean time, becauſe the blood ſtraitned within the boſom of the heart diſtends it, and alſo almoſt choaks it, the Lungs however hindred that they cannot be moved after their wonted and natural manner, perform what they can, with a thick and haſty agitation, whereby the blood may be drawn forth from the Heart; by which endeavour of theirs, the ſhaking air, by the frequent or thick reſpiration, raiſes the viſcous or clammy humidity into froth, like the ſhaking of the white of an Egg; by and by it lifts it upwards towards the cavity of the mouth, and ſo at laſt drives it out of doors: wherefore a foam or ſpumous ſpittle does often ſucceed in other Diſtempers, where the pneumonic or breathing Nerves are either contracted, or are hindred from performing their Function.

Why ſome in the falling knock their Breaſts.

Thirdly, Moreover, from the ſame reaſon it comes to paſs, that ſome Epilepticks being fallen to the ground, beat moſt grievouſly their Breaſts with their Hands, and are hardly to be held from it: for when the *Præcordia* being troubled with the Spaſm, and hindred that they cannot move themſelves after their wonted manner, and the blood ſtagnating in them, not without a great oppreſſion of the heart, threatens a ſuffocation of Life; then it is that the ſick ſtrikes their Breaſt, to wit, that the *Præcordia* ſo ſhaken, and as it were moved up and down, might renew their motions, and ſo the blood might be relieved from its ſtagnation, and the heart from its heavy oppreſſion: and this is done after the ſame manner, as when ſome that are ſleeping being tickled, or bit by a flea, unknown to themſelves, preſently rub, or ſcratch the affected place.

The prognoſtication of the Diſeaſe.

As to the Prognoſtication of the Diſeaſe, we have already declared, that it is of very difficult cure, which difficulty conſiſts in this, that the middle of the Brain (in which is the chief ſpring and fountain of the animal ſpirits) is very much debilitated, not only by the Morbifick cauſe, but alſo by its effects, to wit, the ſeveral fits; and its pores looſened, ſo that they lie open for the entrance of every Heterogeneous matter: and ſo the Morbid diſpoſition it ſelf being confirmed by the repeated Paroxiſms, and taking deeper root, it is hardly taken away. But it is to be obſerved, that the Epilepſie ſometimes terminates of it ſelf, and is ſometimes overcome by the help of Medicines: which happens about the age of puberty, and then only; ſo that who are not cured, that time being elapſed, that is before the twenty fifth year of age, they ſcarce ever after recover their health; for about the time of ripe age there is a two-fold alteration of the humane Body, and therefore there often happens a ſolution or looſing of the Falling ſickneſs, or of any other Diſeaſe deeply rooted: For firſt, at that time, the genital humor begins to be heaped together in the ſpermatick Veſſels, from whence it follows, that the ſpiritious Particles, and what are wont to grow to them, nitro-ſulphureous and Morbifick Particles are laid up, not only in the brain, but alſo in the teſticles: wherefore if this Heterogeneous *Copula* of the ſpirits be more plentifully carried to that new ſtore-houſe, from thence the brain becoming free, often leaves the Epileptical or otherways Morbid diſpoſitiou. 2. About the time of ripe age, as the Blood pours forth ſomething before deſtinated for the brain through the ſpermatic Arteries to the genitals, ſo alſo it receives as a recompence, a certain ferment from thoſe parts through the Veins, to wit, certain Particles imbued with a ſeminal tincture, are carried back into the bloody maſs, which makes it vigorous, and inſpire into it a new and lively virtue; wherefore at that time the gifts both of the Body and Mind chiefly ſhew themſelves; Hairs break out, the Voice becomes greater, the Courſes of Women flow, and other accidents happen, whereby it is plain, that both the Blood and Nervous Juyce, are impregnated with a certain freſh ferment: wherefore the Morbific ferments or ſeeds, unleſs they be overcome by this new natural ferment, they afterwards continue untameable even to death.

But that the Epilepſie is ſometimes cured by the help of Medicines, experience doth teſtify: we ſhall anon Diſcourſe of the method of healing, and ſhew the reaſons of the moſt famous Medicines; in the mean time, as to what further belongs to the prognoſtication of this Diſeaſe, if it end not about the time of ripe age, neither can be driven away by the uſe of Medicines, there happens yet a divers event in ſeveral ſick Patients, for it either ends immediately in Death, or is changed into ſome other Diſeaſe, to wit, the Palſie, Stupidity, or Melancholy, for the moſt part incurable.

The Epilepſie is changed into other Diſeaſes.

As

As to the former, when as the fits are often repeated, and every time grow more cruel, the animal function is quickly debilitated: and from thence, by the taint, by degrees brought on the Spirits, and the Nerves ſerving, the Præcordia the vital function is by little and little enervated, till at length the whole body languiſhing, and the pulſe being looſned, and at length ceaſing, at laſt the vital flame is extinguiſhed.

But that this Diſeaſe often ends in the palſie, melancholly, or madneſs, the reaſon is, becauſe the tone, and confirmation of the brain is depraved by the often exploſions of the animal Spirits, and at length its natural ſtate is ſo perverted, that by the morbifick particles of another kind alſo admitted, the ſpirits are fixed, nor are any more exactly prone to exploſions, but rather ſometimes by a contrary vice introduced, their Elaſtick virtue is too much wanting, ſo that they become dull and ſluggiſh beyond meaſure; even, as oftentimes the intemperature of the blood, being more cold than it ſhould be, admits the more intenſe burning of a fever: and indeed, theſe depreſſions of the ſpirit happens partly by their own proper fault; for that their more agil particles being too much exploſed, the more dull or heavy, are only left, and from them they are ſupplied; but partly, as we have ſaid, they happen from the fault of the brain; for that its pores and paſſages, are ſo dilated and opened, from the often paroxiſms of this falling evil, that afterwards, there is an open paſſage made, for any heterogeneous, and divers kinds of morbifick particles, to enter with the Nervous juice.

Of the Curatory part of the Epilepſie.

Thus much for the Diagnoſis and Prognoſis, the deſcription and judgment of the Epilepſie, or falling ſickneſs; in the unfolding of which, it was neceſſary to bring reaſons not altogether abſtruſe and different from the common Pathology, neither are we conſtrained to receede in the Therapeatick or Curatory part of this Diſeaſe from the common and uſual method of curing in other diſtempers: But in truth, the preſcriptions of ſuch who follow the ordinarily received Opinions, by which, for the moſt part, they endeavour to carry away, and wholly to eradicate the morbifick matter, by Catharticks only, do little or nothing avail in the falling ſickneſs, yea they are wont frequently to be hurtful to it. I have known ſome famous Practitioners, omitting wholly the ſeries of the Curatory intentions, betake themſelves to certain Emperical Remedies, without the foreſight of the whole; this kind of practiſe, though ſometimes it ſucceeds happily, would much more certainly perform the propoſed cure, if the body being rightly prepared, they ſhould in like manner take away all Impediments, by other medicines.

Wherefore, the Indications concerning the cure of the Falling Sickneſs, ſhall be (as they are commonly ſet down) either curatory, which have reſpect to the Fit, and drive it away either coming on, or when upon them, to ſet it going the ſooner: or prophylactick or preventory, which have reſpect to the Cauſe of the Diſeaſe, which if they can take away, its acceſſions will be inhibited afterwards.

A general evacuation has ſcarce any place in the former Intention; for in the fit, neither a Vomit, or Purge, and very rarely the opening a vein, are wont to be adminiſtred; if the amazed inſenſibility and diſorder continues very long, ſometimes a Clyſter is wont to be uſed, but what that chiefly aims at is, to fix the too fierce and volatile animal Spirits, and alſo to ſuppreſs their begun exploſions: For which ends, two kind of Remedies chiefly are made uſe of; to wit, Firſt, ſuch as repreſs the animal ſpirits, being too apt to grow fierce and to leap forth, and repel them with ſome perfume that is ingrateful to them, and compel them into order: which thing indeed medicines imbued with a volatile, or armoniack ſalt, or alſo with a vitriolic ſulphur do effect, of which kind are ſalt and oyl of Amber, Spirits of Blood, Harts-horn, Sut, tincture of Caſtor, and ſuch like: for theſe being inwardly taken, or put to the noſe, oftentimes bring help, and the evil ſpirits of this Diſeaſe are thought to be driven away, even as in *Tobit*, the Devil was by the fume of the gall of a fiſh. Secondly, the animal ſpirits are called away, or hindred from their begun exploſions, when they are allured, or held buſied in ſome work they are accuſtomed to: wherefore, the fit urging, frictions being uſed, and for ſome time continued thorow the whole body do often help: but ſome that ſet upright the diſeaſed, and altogether hold or reſtrain their arms and legs, from their convulſive motion, or hold them violently in this or that poſture; that alſo blow things into their noſes to make them ſneeſe, and pour down ſtrong Cordials at the mouth, and apply either Cupping-glaſſes, and Scarrifications, and handle more ſharply with other manner of adminiſtrations thoſe ſick people, and diſturb the manner of the fit, I ſay this kind of practiſe is moſt often too roughly inſtituted or ordained: becauſe after this manner there is a double trouble put upon nature, to wit, one from the diſeaſe, and the other not lighter from the ſtanders by, and helpers, when it were much better, for the fit to be ſuffered to paſs over after its own manner, and the ſick to endure but one trouble only.

Truly the chiefeſt care of a Phyſician, and efficacy of Medicines is uſed about the prevention of this Diſeaſe, that the cauſe being taken away, or its root cut off, all the fruits might wither; Medicines requiſite to this indication, reſpect many intentions, which may yet be reduced to thoſe two chief heads; to wit, in the firſt place, that the enkindling or matter of the Diſeaſe being ſupplied immediately from the vicious blood, or nervous juice, and mediately from the Viſcera and firſt paſſages be cut off; then in the ſecond place, that the evil diſpoſition of the brain, and the ſpirits its inhabitants, which is peculiar to the Epilepſie, be taken away.

As to the firſt indication here, Vomits, Purges, and other things, both evacuating, and altering, yea Phlebotomy, and Cauteries have place; foraſmuch as by theſe means and ways the impurities both of the viſcera and humors are ſubdued or brought away, and their dyſcraſie or evil diſpoſition amended: for although theſe kind of Medicines, and Medical adminiſtrations, rarely or never cure the Epilepſie by themſelves; yet thoſe take away impediments, ſet nature upright, and incite her to encounter her enemy; alſo, they prepare the way, that ſo ſpecific Remedies might more certainly and efficaciouſly ſhew their virtues; wherefore, uſually, whilſt they take care to cure this Diſeaſe, with ſecrets and hidden myſteries, they make uſe of thoſe kind of Medicines between whiles, in the Spring, and Autumn, and other fit times.

Secondly, As to ſpecific Remedies, which indeed only, though not always, are able to reach the Epilepſie and to ſubdue it; of which ſort are the *Male Pæony*, *Miſſletoe*, *Rue*, *Caſtor*, the *Claws* of an *Elk*, preparations of a dead mans *Skull*, *Amber*, *Coral*, with many others. Foraſmuch as theſe are taken without any ſenſible evacuation, or alſo perturbation following in the viſcera or humors, it is a wonder by what formal reaſon, or virtue of acting, they are wont at any time to help in this Diſeaſe.

In what the Virtue of the ſpecificks conſiſts in the Epilepſie.

Concerning this matter, intricate and obſcure enough, if there may be place for conjecture, when as we have already aſſerted the procatartick cauſe of the Epilepſie, to conſiſt in the Heterogeneous *Copula*, joyning or cleaving to the ſpirits inhabiting the Brain, and inciting them to preternatural exploſions; it follows, that thoſe things which take away, or reſiſt ſuch a cauſe, muſt be of that nature, that by ſtrengthning the brain, and binding up its pores, may exclude that *Copula*, and ſo fix, and as it were bind the ſpirits, flowing within the middle or marrow of the brain, from leaving their *Copula*, that they ſhall not be any more apt or prone to irregular exploſions; perhaps after the ſame manner, as when Gun-powder or Aurum-fulminans being pounded with Sulphur, or ſprinkled with ſpirit of Vitriol, loſes its thundering virtue. And indeed, theſe kind of properties, to wit, one or both of them may be ſuſpected, yea, in a manner detected, in moſt anti-Epileptick Remedies: For truly, *Pæony*, *Miſſletoe*, *Rue*, the *Lilie* of the *Vally*, with many others, abound in a certain manifeſt aſtriction, that 'tis likely, their Particles being taken inwardly, and ſo dilated to the brain, by the Vehicle of the blood and nervous juice, do ſo bind, and ſhut up its too looſe and open pores, that afterwards they do not lie open, for the paſſage of the Morbifick matter: Beſides, for that theſe vapourous Concerts, breathe forth as it were an Armodiack ſcent or ſcattering; therefore they are ſaid to purifie the animal ſpirits, to fix them, ond to ſtrengthen them, having put off their Heterogeneous *Copula*: This virtue purifying the ſpirits, proceeding from an Armoniac Salt, is more apparent in Remedies, which are taken from the famuly of Minerals and Animals, ſuch are the preparations of the *humane Skull*, of *Blood*, *Amber*, and *Coral*, as the other, more binding, rather exiſts, in the parts and preparations of Vegitables.

It will not be needful here, for the curing of the Epilepſie, to propoſe a compleat method of healing, with exact forms of preſcriptions, becauſe there are extant every where among Authors, general Precepts, and moſt choice Remedies; and the prudent Phyſician will eaſily accommodate, both the Indications, and that plentiful proviſion of Medicinal ſtuff, to the particular caſes of the ſick. But becauſe we have exhibited a quite new Theorie of this Diſeaſe, here alſo ought to be rendred a curatory method fitted for it: which we ſhall deſcribe by and by more fully, after we have ſhewn you ſome Caſes or Hiſtories of people ſick of the Epilepſie.

1. Obſervation. A fair Maid, ſprung from Parents indifferently healthful, being her ſelf very well, till about her coming to ripe age, about that time, ſhe began to complain of her head being ill: And firſt of all, ſhe felt near the fore-part of her head, by fits, a vertigo or giddineſs, whereby all things ſeemed to run round; and alſo whilſt this ſymptom continued, ſhe was wont to talk idlely, and to forget whatever ſhe had but juſt done: Theſe kind of fits at firſt paſs'd away within a quarter of an hour, and came again only once or twice in a Month, in the interval of which ſhe was well enough: Afterward, the aſſaults being made more grievous by degrees, they alſo return'd more often, and within half a Year, her Brain being daily more weakend, this giddineſs or turning round

was

was plainly changed into the Epilepſie, that the ſick being ſtruck down to the ground at every fit, was affected with Inſenſibility, and horrid convulſions, and alſo with foam at the mouth. The Domeſticks obſerved, that ſhe always fell on the ſame ſide, ſo that ſitting near the fire, if ſhe ſate in the right Corner ſhe would be flung in the midſt of the fire, but if in the left Corner, ſhe fell againſt the wall of the Chimny: once when being left alone in the houſe, ſhe fell upon the burning Coals, and ſo miſerably burnt her face, and forepart of her head, that the skull being made bare of the skin and fleſh, a deep and large eſcar was burnt into it: and afterwards the outer ſhell of it fell off a hands breadth. In the mean time the ſick Maid, ſo long as the ulcers contracted by the burning, ran with filthy matter, ſhe was free from the fits; but afterwards, they being healed up, the falling evill returned: This Diſeaſe began firſt to ſhew it ſelf about the time of Puberty; for this maid, preſently after the beginning of it, had her Courſes, and afterwards they conſtantly obſerved their ſet times, tho her diſtemper grew daily worſe: Various kinds of Medicines being adminiſtred to this ſick Creature, availed nothing, becauſe it was the cuſtome and practiſe of her and her friends, quickly to change both the Phyſician, and method of Phyſick, if any happy event did not preſently follow, and to betake themſelves very much to every Emperick, and outlandiſh Mountebank.

That in this Caſe, the Vertigineous Diſtemper, with a ſhort delirium, was the forerunner of the Epilepſie, it plainly argues, the original of this Diſeaſe being planted in the middle of the brain, to depend upon a certain inordination of the Spirits; to wit, thoſe dwelling there, at the beginning, begun to admit an heterogeneous Copula; which being more plentifully heaped up, being moved either of its own accord, or occaſionally, while it was ſhaken off, induced by reaſon of the Spirits being diſturbed, and not yet very exploſive thoſe former diſtempers; Afterwards, from the ſame cauſe by degrees growing worſe, the perturbations of the Spirits did raiſe up their manifeſt exploſions, and changed the vertigo, and *Delirium* into the Epilepſie.

But that this Maid began to be ſick, about the time of ripe age, it hence evidently follows, as the natural ferment, ſo ſometimes the præternatural, explicates it ſelf, firſt at that time; wherefore as it happens, that the menſtruous purgations do then firſt break forth, ſo the ſeeds of the falling ſickneſs, whether innate or acquired, then budded forth a little, and by degrees were ripened into fruit: when the preternatural Ferment firſt appears, ofttimes the natural following blots it out, hence the Epilepſie of young ones, often ends about the time of puberty or ripe age, but if that ferment or taint of the diſeaſe, comes after the menſtruous flux, or together with it, and ceaſes not preſently, it remains for the moſt part afterwards, during life, of it ſelf untameable, and not to be overcome by any Remedies.

From this Obſervation, that a Cautery accidentally, and by chance, being made on this ſick party, freed her from the fits of the Diſeaſe, it may be inferred that fontanells or iſſues, may be profitably adminiſtred, in the cure of the Epilepſie: for whereſoever an emiſſary is opened for the conſtant carrying away of the ſerous water, both from the blood and nervous juice, there very many heterogeneous and morbifick particles flow out with it, that therefore the brain might remain free.

The Daughter of a Brewer of *Oxford*, had been very obnoxious to a Rheume falling into her eyes from her Infancy, otherwiſe ſtrong and ſound enough, alſo accuſtomed daily to hard labour, about the 14. year of her age, ſhe began to be tormented with Epileptick fits, of which ſhe ſuffered near the greater changes of the Moon, eſpecially then returning: Being asked to endeavour her Cure, I gave her a Vomit of precipitate Solar, and ordered it to be renewed three days before every new and full Moon; beſides that ſhe ſhould take at every turn for four days after the Vomit, twice in a day, a dram of male-Pæonie root in powder with a draught of black Cherry water. By theſe remedies, the fits ſo long intermitted, that the diſeaſe ſeemed to be cured. Afterwards when they returned again, ſhe was again recoveted by the uſe of thoſe medicines: and then the menſtruous flux breaking forth, and obſerving its true periods, ſhe remained for the future free from that diſeaſe. *2. Obſervation.*

The Therapeutic or Curatory Method.

IN the Curing of the Epilepſie, I judg it fit to begin with a Cathartick, and if the ſick can eaſily bear vomiting, firſt let an Emetick be adminiſtred, and for ſeveral months let it be repeated, four days before the full of the Moon. For infants and youths, may be preſcribed wine of Squils, mixed with freſh *Oyl of Sweet Almonds*, or alſo of *Salt of Vitriol*, from half a Scruple, to 1. Scruple: For thoſe of riper years, and of a

Vomitaries. ſtronger Conſtitution may be preſcribed the following forms of Medicines. Take of *Crocus mettalorum*, or of *Mercurius vitæ* gr. iiii. to vi. of *Mercurius Dulcis* grain xvi. ℈ i. let them be bruiſed together in a mortar, mix it with the pap of a roſted Apple or of *Conſerve of Burage* one Ounce, make a Bolus; or you may take an infuſion of *Crocus Mettalorum* or *Mercurius Vitæ* made in Spaniſh Wine from half an Ounce to an Ounce and a half, or take of *Emetick Tartar* of *Mynſicht* gr. iv. to vi. who are of a tenderer Conſtitution, let them take of the *Salt of Vitrial* ℈ i. to ʒ ß, and half an hour after let them drink ſeveral pints of poſſet-drink; then with a feather or finger put down the throat, let vomiting be provoked, iterate it often.

The day following the vomiting, unleſs any thing ſhall prohibit, let blood be taken out of the Arm, or from the Hemerhod Veins with a Leech: then the next day after, let a purging medicine be taken, which afterwards may be repeated conſtantly four days every new Moon.

Purges. Take *Reſine af Jalop* ℈ ß, *Mercurius Dulcis* ℈ i. of *Caſtor* gr. iii. of *Conſerve* of the *Flowers of pæony* one ounce, make it into a *Bolus*. Take *pill fætida* the greater ℈ii. of *Hyſterica* what will ſuffice, make thereof v. pills. Take of the ſtrings of *black hellibore* macerated in Vinegar, dried and powdered half an ounce of Ginger ℈ß. of the *Salt of Wormwood* gr. xii. of the *Oyl of Amber* drops ii. make a powder, let it be given in the Pap of an Apple. Take of the powder of *Hermodactils* compound one ounce, of *humane Skull* prepared gr. vi. make a powder, let it be given in a draught of the *decoction of hyſſop* or *Sage*.

On thoſe days that they do not purge, eſpecially about the time of the changing of the Moon, let there be adminiſtred Specifick Remedies morning and evening, which are ſaid to cure this diſeaſe, with a certain innate and ſecret virtue: of theſe there are extant a very great company, and are preſcribed in various forms of Compoſitions.

Specifick. The moſt ſimple Medicines which experience hath found to be very Efficacious, are the *Root of the male Pæony*, and the *ſeeds* of the ſame. Take of the *Root of the male Pæony* dried and powdered one ounce, to ii. or iii. let it be given twice a day in the following Tincture. Take of the *leave of Meſletow* of the *Oak* two ounces, of the *root of Pæony* ſlic'd half an ounce, of *Caſtor* one Ounce; let them be put into a cloſe Veſſel with ſimple water of *Betony* or *Pæony*, and white-wine, each ℔ i. of the *Salt of Miſletow* of the *Oak* or the *common Miſletow* two Ounces, let them digeſt cloſe in the hot ſand for ii. days, let them take three Ounces with a doſe of the aforeſaid powder.

Poor people may take of the aforeſaid powder in a decoction of *Hyſop* or *Caſtor*, made with fair water and white-wine.

At the ſame time let the *Root of Pæony* be cut into little bits, and being ſtrung upon a thred, hung about the neck. Alſo let the Roots being fried in a pan, or boiled tender, be eaten daily with their meat.

Take of the *Root* and *Seeds* of the *male Pæony* each two Ounces, of *Miſletow* of the *Oak*, of the *hoof of Elk* one dram each let them be ſliced and bruiſed, and put into a thin ſilk bag, and hang at the pit of the Stomack.

Powders. Among the Specificks, this powder is greatly commended by many Authors. Take of *Caſtor Opoponax*, *Dragons blood*, *Antimony* and the *ſeed* of *Pæony*, each alike, make a powder, of which may be taken half an Ounce to one Ounce every morning, with wine or ſome proper decoction, or with *black Cherry water*.

Take of a *mans Skull* prepared one Ounce, of *Miſletow of the Oak*, of *Counterfeit Cinaber*, of an *Elks Claw*, each half an Ounce, ſo mingle them. The doſe is ℈ ß. to a Scruple.

If the form of powder be diſtaſtful to any one, or if it ſhould become loathſome by the long uſe of it, *Electuaries*, *Pills*, *Troches*, *Spirits*, and *Elixirs*, each of which agree with ſpecifick medicines, are wont to be preſcribed.

Electuaries. Take of the *Conſerve* of the *male Pæony*, of the *Lilly* of the *Valley* each three Ounces, of the *ſeed* and *root* of the *male Pæony* powdered each ʒ ii. prepared *Coroll* ʒ i. of the powder of *Pearls*, and of *humane Skull* prepared, each two ſcruples, of the *ſalt* of *Miſſletow* of the *Oak* ʒ i. ß. with what will ſuffice of the *Syrop* of *Corall*, make an *Electuary*, let them take of it morning and evening, the quantity of a Nutmeg.

Take of the Powder of the *root* of the *male Pæony* one Ounce, of the *ſeeds* of the ſame half an Ounce, of *Miſletoe* of the *Oak*, of an *Elks claw*, of *humane Skull*, prepared each two drams; of the *roots* of *Angelica*, *Contrayerva*, *Verginian Snakewood*, each ʒ i. of the whiteſt *Amber*, of *Calcined Corall* each ʒ i. of the *Common ſort of Miſletow*, ʒ ii. of *Sugar Candy* eight ounces diſſolved in what will ſuffice, of the *Antiepileptical water of Langius*. Make a Confection, of which take twice in a day the quantity of a Nutmeg.

Pills. Theſe Powders, by adding to them the *Salt of Amber*, and *harts-horn*, with what will ſuffice of *Balſome Capivi* may be formed into a *pillurary Maſs*, of which may be taken iii. or iv. pills, in the morning and evening, drinking after them a draught of ſome appropriat Liquor.

Or

Or of thoſe ſorts may be prepared an *Elixir*, of which may be taken viii. drops to x. twice in a day, in a ſpoonful of a proper *Julup*, drinking a little of it after it.

Take of *Hungarian Vitriol* vi. Pints, let them be diſtill'd with a Glaſs retort in hot ſand for 24 hours, then let the ſame retort, being defended or done over with Clay, be put with a large receiver in a reverberating Furnace, that the acid ſpirits may be forced with a moſt ſtrong fire, till they come forth. The whole Liquor being diſtilled, let it be drawn off in hot ſand, in a leſſer Glaſs retort, and let there be poured into the *Matrace*, of the *roots of Male-Pæony* cut into pieces and dried, four Ounces of the *ſeed* of the ſame, one Ounce of *humane Skull* prepared, of *Elks claws* and *red Coral* each half an Ounce, *Miſſletow* of the *Oak* ii Drams, let it digeſt with a gentle heat for ſeveral days, to the extraction of a tincture, the Liquor being decantated, let it be drawn off in a Glaſs retort to a third part remaining: being ſtilled forth, keep it by it ſelf; to thoſe remains, pour of the rectified ſpirit of Wine a little quantity, impregnated with the infuſion of the ſame ingredients, and let it digeſt for ſix days in Horſe dung, the Doſe of which is half a Scruple to a Scruple. The diſtilled Liquor may be given from half a ſpoonful to a whole ſpoonful, for the ſame intentions. *Elixir.*

Or let there be prepared an Oil, out of the *Salt of Venus*, or *Copper*, according to the deſcription of *Henry Van Heers*, and given as there preſcribed.

Among the ſpecifick Remedies, which (when the former ſhall not be profitable) ought alſo to be tried, are the *Livers of Frogs*, the *Gall of a Boar* dried with Urine, the Powder of *Bryony Root*. The Powder of a *Cuckoe*, of *Crows*; the *Runnet* and *Lights* of a *Hare*, the *Liver of a Wolf*, *ſtones taken out of Swallows*, the *Liver* of a *Kite*, the *Eggs* of *Crows*; with many more, to be daily taken with Food or Medicine; a famous Catalogue of which is extant of *Henry Van Brays*, a Phyſician of *Zutphen*: and from which preſcripts for poor people may be taken, eaſie to be prepared, and without great coſt. *Emperical Remedies.*

Whilſt theſe kind of Remedies are to be taken inwardly, according to the aforeſaid method, ſome outward adminiſtrations being applied, bring help, and are deſervedly admitted to part of the cures; therefore, always Iſſues are made in this Diſeaſe, in one fit place or other; and alſo more often Veſicatories or Bliſters.

Amulets hung about the Neck, or born at the pit of the Stomach, are thought to be uſeful: The freſh *Roots of Pæony* cut into little ſquares, and being ſtrung like Bracelets, and hung round about the Neck, and as ſoon as they are dry, let new be put in their places, and they being reduced to Powder, may be taken inwardly: Take of the *Roots* and *Seeds* of *Pæony* each ii. Drams, of an *Elks Claw*, and *humane Skull* prepared, each one Dram, of *Miſſletoe* of the *Oak* half a Dram, let them be beaten into groſs Powder, and ſewed in a piece of red Silk, and like a little bag, let it be hanged about the Neck. *Amulets.*

An *Amulet* of a *ſtalk* of the *Elder*, found growing in the *Willow-tree*, is greatly commended.

It agrees with ſome, to have their heads ſhaven, and a Plaiſter applied to the forepart. Take of the *root* and *ſeeds* of *Pæony*, of *Caſtor*, *Miſſletoe* of the *Oak*, of *humane Skull* moſt finely Powder'd, each one Dram, of *Bettony* Plaiſter two Ounces, *Caranna*, *Tacamahacca*, each two Drams, *Balſum Capive*, what will ſuffice, make a maſs, and let it be ſpread upon Leather, make a Plaiſter for the ſuters of the Head. *Plaiſters.*

Let the Temples and Noſtrils be often anointed with *Oil of Amber*, by it ſelf, or mixed with *Oil Capive*.

Sneezing Powders, and ſuch as purge the Head of *Rhume*, are to be uſed daily in the Mornings: Take of *white Hellebore* one Dram, of *Caſtor*, and *Euphorbium*, each half a Dram, the *Leaves* of *ſweet Marjorum*, and *Rue*, each two Drams, make a Powder; make a decoction of *Sage* or *Hyſſop*, with *Muſtard* diſſolved in it, with which gargle the Mouth and Throat. *Sternutories or ſneezing powders.*

A Glifter may be ſometimes uſed, as need ſhall require.

Sometimes the more ſolid Medicines are to be moiſtned with liquids, or they ought to be drunk after them, for which end Diſtilled waters ſhould be at hand, *Julups*, *Tinctures*, or *Decoctions*; which are endued with a certain Specific virtue againſt this Diſeaſe.

Take of *Hungarian Vitriol* four Pound, of the Powder of freſh *human Skull*, four Ounces, of the *root* of *Pæony* ſliced, ſix Ounces, let them be bruiſed together in a Morter, put to them either of *Spaniſh-wine*, or ſmall *white-wine*, or *wine* made of the juice of *black-Cherries*, a quart; being fermented in a Veſſel, let it be diſtill'd in a Glaſs-retort, in hot ſand. *Diſtill'd Water.*

Take of the ſhavings of *Box-wood*, of *Hungarian Vitriol*, each two pound, of the *Miſſletoe* of the *Oak*, or the *common Miſſletoe* leaves, three handfuls, of *Rue* two handfuls,

fuls, being bruised together, put to it of *Spanish-wine*, four pints: Let them be distill'd in a Glass Cucurbit, with hot sand.

Julups. Take of common *Vitriol* six pound, of the *root* of the *Male Pæony* six Ounces, of the *Missletoe* of the *Oak* one Ounce, of *green Walnuts* eight Ounces; being cut and bruised, let them be distilled in a Glass-pot, a *Glass Alembick* being placed upon it, in hot sand. Take of this Liquor one pint, of *black Cherry-water*, and of the *water* of the *flowers* of the *Toil*, or *Line-tree*, each half a pint, of *white-Sugar* four Ounces, mix them, and make a *Julup*; the Dose two Ounces to three Ounces, twice or thrice in day.

Oxymel of *Squils*, also an *hony decoction* with *Hyssop*, are much praised by the Ancients. Or an *Apozem* of this kind may be prepared, of which may be taken four Ounces, to six or seven, twice in a day.

Apozems. Take of the *roots* of *Male Pæony*, *Angellica*, *Imperatoria*, *Valerian*, each six Drams, of the *leaves of Betony*, *Sage*, *Lilly* of the *Valley*, *Penny-Royal*, each one handful, of the *seeds* of *Rue*, *Nigella*, each three Drams, *Pæony* half an Ounce, of *Raisins* three Ounces, of *Liquorish* half an Ounce, being cut and bruised, let them be boiled in six pints of *Spring-water*, to the consumption of the third part. Towards the end, add of *black Cherry wine* half a pint, or ten ounces, strain and keep it in close Vessels. The Dose is from six to eight Ounces, twice in a day, after the afore-prescribed Remedies.

Or the aforesaid ingredients, excepting the *Liquorish*, and *Raisins*, may be boiled in six pints of *Hydromel*, or *Water* and *Hony*, or *Meath*, to the consumption of the third part. The Dose four to six Ounces.

Great Remedies. If that the aforesaid method, consisting in the use of *Cathartick*s, and *Specificks*, being for some time tried, and altogether in vain, you must come to Remedies of another kind, and chiefly to those called Great, or Notable: In this rank are placed *Diaphoreticks*, *Salivation*, *Bathes*, and *Spaws*.

Alphonsus Ferrius affirms, That he had cured many Epileptical people, with a decoction of simple *Guaicum*, being prescribed twice in a day, and taken to six or eight Ounces, and its second decoction drunk (as in the cure of the *Pox*) instead of ordinary drink. If to such a decoction the *roots* of *Pæony* and other Specificks should be added, perhaps it would be more efficacious. It seems probable, that a *Salivation* strongly excited from *Mercury*, and afterwards a *Sudoriferous* or *Sweating-Diet* following, might certainly cure this Disease. What *Baths*, or *Spaw-waters* are able to do, I have not observ'd, either by my own or others experience. Perhaps I have made trial, that our Artificial *Spaws* sometimes have been available in curing the Epilepsie, to wit both those impregnated with *Iron*, and also with *Antimony*, and taken in a great quantity for many days.

CHAPTER IV.

Of other kinds of Convulsions, and first of the Convulsive Motions of Children.

After the Epilepsie, as it were the principal Spasm, in the chief place excited, to wit, within the middle part of the Brain; the other kinds of Convulsions come to be treated of in order. The differences of those are best taken from a twofold kind of cause, and the various manners and accidents of either. We have already shown that all Spasmodic Distempers do flow either from the meer irritation of the spirits, or from their explosion, by reason of the cleaving of an Elastick *Copula* to them, or jointly from both together: wherefore, the manifold Ideas of Spasms may be distinguished, and distributed into certain Classes, as it happens for this or that cause, or either together, to remain in the various places of the *Encephalon*, or the Nervous Appendix. For indeed, the Spasmodic matter, or the Explosive *Copula* of the spirits, finding a passage chiefly, and most often thorow the Brain, and sometimes in some measure thorow the extremities of the Nerves, subsists either about the origine of the Nerves, or their middle processes, or their outmost ends, or abounds in their whole passages, as shall be by and by more particularly declared. Further an irritation stirring up Convulsions by it self, or with a previous remote cause, although it be made every where in the Nervous stock, yet it chiefly, and more frequently produces such an effect, about the beginnings,

beginnings, middle processes, and foldings, or ends of the Nerves. But the same kind of cause and effects, are after one manner in Infants and Children, and another in Youths, and those of riper age. Since therefore we have determined, particularly to consider all the kinds of Convulsions, we will first discourse of the Convulsive motions of Infants and Children.

Infants and Children happen so ordinarily, and frequently to be tormented with Spasmodic Distempers, that this is reckoned the chief, and almost the only kind of Convulsions; for the symptoms of this kind, in other more ripe People, are wont to be called by other known Names, and referred to the Epilepsie, Hysterick, Hypochondriack, Collick Passions, or also to the Scurvey: but in Children they are called, as it were by way of excellency, Convulsions.

As to this we must observe, that Children are found to be greatly obnoxious to Convulsions, chiefly about two seasons, to wit, within the first Month after they are born, or about their breeding of Teeth: Although it often happens, that the assaults of this Disease may come also at other times, and from certain other causes.

In the first place therefore, it very often happens that Children newly born, or at least ere they are two Months old, are afflicted at every turn with Spasms, excited in divers parts; for that inversions of the Eyes, distortions of the Cheeks and Lips, or tremblings, yea contractions of the Tendons, and frequent jerkings or leapings forth of the Members, and sudden shakings of the whole Body infest them; and that the same effect likewise sometimes afflicts the *Præcordia*, appears plain enough, because whilst the Spasms busie the Limbs, and outward Members, also the Face becomes now pale, now of a livid, or dead colour, from the Blood stagnating in the Heart, and the Lungs being at that time contracted. As therefore, Spasms are wont to infest three regions of the Body in Children, to wit, the parts of the Head and Face, the outward Members and Limbs, and the *Præcordia* and *Viscera*, we observe now these regions, now those, now two, or all together to be possessed, by the Morbific cause, to wit, as it is fixed, either about the beginnings, or ends of the Nerves; and when the former of these happens, as the superior part of the oblong pith, the middle, or the lowest part of the spinal marrow is touch'd, one or more parts together are assaulted by the Morbifick cause.

As to the other causes of this Distemper, to wit, the procatartic and evident, those of the former kind, do chiefly consist in two things: First, that all the parts of the Head in Infants are very weak, and abound with a viscous humidity; to wit, the Brain less firm, and the tone of the Nerves very loose, so that they are not able to bear the more light force of every matter, but the spirits inhabiting them, are easily incited into irregular Motions or Spasms, by the proper Liquor, wherewith those parts are watered, if it flows never so little immoderately, or at least more plentifully, than for the measure of so little strength. But in the second place, because it appears by observation, that Children, not only, nor all, who are of a more tender Constitution, are found to be prone to this Disease, therefore this ought to be rather accounted for a reason of the more remote Morbid cause, that the Blood, and Nervous Juice, are originally vicious in some Infants, by reason of evils contracted from the Womb: For that the sanguineous mass, wanting eventilation for many Months past, becomes impure in Children newly born; wherefore, broad and red puttings forth, like the small Pocks, shew themselves through the whole skin, in most Children, soon after they are born; to which sort of wealks, or efflorescences, if they are hindred or repressed, oftentimes dangerous exulcerations, about the parts of the mouth follow. Hence we may deservedly suspect such impurities of the blood, sometimes to be poured forth into the brain and nervous stock, considering their debility, and for that reason Spasmodic Distempers to arise; to wit, whilst the blood being vicious from the Womb, endeavours to purifie it self, it transfers its fæculencies into the Head, which were wont to be exterminated by the putting forth the red gum, or red spreadings thorow the skin: Wherefore, a water now thin and serous, now thick and sticking, and either participating of preternatural Salts and Sulphurs, is laid up within these or those recesses and cavities of the Brain, Cerebel and oblong pith, the recrements of which, when they begirt the beginnings or ends of this or that Nerve, and sometimes many together, affix on the spirits inhabiting them Heterogeneous Particles, and apt for Spasmodic or Convulsive explosions. For as soon as the Nerves have deeply imbibed such Particles, the spirits being burthened with their *Copula*, endeavour either of their own accord, or being incited by evident causes, to thrust and shake it off; and so they enter into Spasmodic or Convulsive explosions.

The evident causes, which bring on Convulsive motions in Children predispos'd, are of two kinds, *viz.* In the first place, whatsoever stir up unwonted effervescencies of the

the blood, whether they be excesses of heat or cold, a too plentiful nourishment, or hotter than should be, the changes of the Air and Weather, and chiefly the periodical times of the Moon; for by reason of these, and other the like occasions, the Blood growing more hot than by right it should be, affixes sooner to the spirits an Heterogeneous *Copula*, even to a fulness, and causes it presently to be struck off and exploded, by them throughly disturbed. Secondly, An irritation in almost every part of the nervous System, does not seldom bring into act, a Spasmodic or Convulsive Disposition: wherefore, not only an excess of tangible qualities outwardly inflicted, but the milk Coagulated in the stomach, choler, or other sharp humors, or also Worms knawing the Intestines, are wont to excite Spasms or Convulsions: Besides, these kind of evident causes, as they are stronger, sometimes induce Spasmodic Distempers of themselves, and without a previous disposition: even so Worms, and perchance sharp humors, cause Convulsive motions to some Children, at least to the more tender.

That it might more certainly, and to the sense appear, what kind of Morbific matter might be in Convulsive motions, I have opened the dead bodies of many which this Disease had oppress: I have always in vain sought the cause within the Viscera, and first passages of Concoction; In the heads of many, a serous water being heaped up, within the Cavity, under the Cerebel, and distending the Membrane which clothes the oblong pith or marrow, did overflow the beginnings of the Nerves: in some, no footsteps of this Disease appeared: so that, what sticking to the spirits did irritate them into explosions, was of so imperceivable a bulk, and its original so altogether hid, that it could not be found out by the most perspicatious scrutiny of the sight. Sometime past, in this City, many Children of a certain Woman died of this Disease, at length the fourth, as the others, died within the Month; we dissected the Head, and here no serous Colluvies or Water did overflow the Ventricles, but only the substance of the Brain, and its Appendix, was moister than ordinary, and looser; what was most worthy of observation, was, that in the Cavity, which lies under the Cerebel, upon the trunk of the oblong pith, we found a remarkable heap of clotter'd, and as it were concreted blood: but in truth it is uncertain, whether this matter deposited there from the beginning, had primarily caused the Convulsions; or rather, whether this blood being extravasated and expressed, by the contraction of the parts planted round about, was not the effect and product of the Convulsions, and not the cause of them; for also in Apoplectical people this kind of Phænomenon ordinarily happens; which yet we shall afterwards shew to be rather the effect, than the cause of the Disease.

Indeed, the Heterogeneous Particles, which flow to the Blood, from the Womb, are wont to be sent away through Efflorencies or Cutaneous Pustles in the whole Body in many Children, in others being poured on the head, are the material cause of the Convulsive Distemper, may be inferred, besides the reasons before recited, from the Remedies chiefly helping: For that in little Children, obnoxious to this hereditary Disease, the Convulsive Fits are best prevented, if that an Issue be made presently after they are born in the nape of the Neck, and blood drawn with a Leech from the Jugular Veins; for the corruptions of the Nervous Juice, are brought away by that, and the impure buddings of the blood, are diverted from the head by this: by these ways of administrations, when before two or three Children, of the same Parent, have died of Convulsions, soon after they were born, all the rest have been freed from the same evil.

Secondly, Thus much concerning the Convulsive motions of Children, which are wont to infest them, by reason of an Infection contracted from the Womb. If that at this bout they should escape the Disease it self, or at least its deadly strokes, nevertheless, about the time of breeding Teeth, they would be found at last to be obnoxious to the same danger: for when the Teeth, especially the greater, are about to cut, oftentimes a Fever is excited, to which not seldom Convulsions are joined: and though at this time Children are grown stronger, and may better bear the fits of the Disease, than when new born, yet the Convulsive Distemper, now stirred up by no other grievous occasion, becomes very dangerous, and sometimes deadly.

But forasmuch as Children, who fall into Fevers about the time of breeding of Teeth, are not all tormented with Convulsions, it therefore follows, that some disposition to this Disease, either innate, or acquired, doth proceed; and that the pain caused from the breeding the Teeth, is to be esteemed only the means of a more strong evident cause, to wit, Children, who being indued either with a Cacochymia or Juice, causing ill digestion, or with a more weak constitution of the brain and nervous stock, have their animal spirits too much adulterated, or dissipable, are sometimes disposed for the coming of Convulsive Distempers: wherefore, when so acute pain, together with a Fever, afflicts, that latent disposition is brought into act.

If

If it be here asked, for what reason a fever, and then Convulsive Motions following thereupon, come to those predispoſed, in teething, it may be answered, that either effect may be attributed to the pain, as the immediate cause: We experimentally know by our selves, what the torment is, that follows an irritation about the roots of the Teeth; in truth so great and so cruel, that a more cruel can scarce be; for that one or two notable shoots of the fifth pare of nerves, reaches to the roots of each Tooth, which when it is hauled by the sharp particles of the Blood, or other humors, there laid up, causes a most sharp sense of trouble, or pain by its Corrugation: But this kind of Vellication or hauling of this Nerve, happens thus to children breeding teeth, because that the membranes and fibres are every way distended by the Teeth, now increasing into a greater bulk, and as yet included within the scarce hollow gums: hence the blood being hindred in its Circulation, causes a tumour, and so presses the nerves; and also pours on them the more sharp particles of the Serum, by which being notably pulled or hauled, they are tormented with Corrugations, and painful Spasms.

Therefore, when so cruel pains happen to children from their breeding Teeth, it is no wonder if a feaver, and also convulsive motions sometimes follow: the former of these happens, both for as much as the blood being hindred about the pained part, is not circulated with its wonted aud equal course, wherefore it becomes inordinately moved, in the whole body; and besides, because Spasms being stirred up somewhere in the nervous stock, the corrugated and contracted nerves, press together, and pull the arteries, and by that reason, stir up irregular and feverish fluctuations in the blood. But sometimes Convulsions happen in breeding Teeth, both because the blood growing hot, sends forth heterogeneous particles, to the animal government, and so stirs up the spirits into explosions; and besides also, when this acute pain, and as it were a lancing, follows upon the teeth being about to cut, it communicates a very troublesome and irritative sense, from the affected parts, to the first sensory, presently from thence, the motion of the rage is retorted by the same or other neighbour Nerves, which by reason of a previous disposition, doth not rarely become convulsive.

Besides these two occasions of Convulsions (which are wont to be chiefly, and more often in children) to wit, the times of Infancy and breeding Teeth, this Distemper also is excited at other times very often, and for other causes: For in whom the Seeds of the Spasmodick Disposition is sown, they sometimes unfold themselves presently after the birth, and are ripened into morbid fruit; or else lying hid for a while, they now come before the breeding of Teeth, and follow a long time after it; and by reason of other evident causes, to wit, either external or internal; of which sort are a sickly, or breeding nurse, milk Coagulated in the stomack, or degenerating into an acid or bitter putrifection, a feverish distemperature of the head, ulcers or wealks of other parts suddenly vanishing, the changes of the air, the Conjunctions, Oppositions, and aspects of the Sun and Moon, and surh like; they at length break forth into Act, from an uncertain event. Concerning these, there is no need, that we should particularly discourse.

When all the Children of a man dwelling in the neigbourhood, died of Convulsions, within the space of three months, at length to prevent that fatal event, they sought for remedies, for a child newly born: I being sent for, a few days after the being brought to bed, first advised the making an issue in the nape of the neck, then, that the next day after, a leech being applied to the jugular vein of each side, two ounces of blood should be taken away: Besides, that about every conjunction, or opposite aspect of the Sun and Moon, about five grains of the following powder should be given in a spoonful of Julap, for three days, morning and evening. Take of humane Skull prepared, of the root of the male pæonie, each one dram, of the powder of Pearls half a dram, of white sugar one dram, mingle them, and make a very fine powder. Take of the waters of Black Cherries three ounces, of the antiepileptic of *Langius* one ounce; of the syrrup of the flowers of the male Pæony six drams, mingle them; also I ordered that the nurse at the same times, should take a draught of whey, or posset drink, in which were boiled the seeds and roots of the male Pæonie, and the leaves of the Lilly of the Vally; the Infant for about four months was well, but then began to be troubled with Convulsions: at which time, the same remedies being administred both to the child, and to the nurse, in a larger dose, Vesicatores also were applied behind the ears, aud blood was taken by the sucking of a Leech, from the jugular veins: within two or three days the child grew well: afterwards, whenever within four or five months the Convulsions returned, it was cured again, by the use of the same Remedies. After half a year, the convulsive motions wholly ceased, but a painful Tumour arose, about the lower part of the *Spinæ dorsi* or back-bone, from which proceeded a certain distor-

tion of the *Vertebræ*,or joints of the back-bone,and a weakneſs of the legs,and at length a Palſie.It ſeems in this caſe, that the Spaſmodic or convulſive matter, being wont to come upon the brain firſt, and beginnings of the nerves, entring at laſt the Spinal marrow,and being thruſt out at its further end,it wholly ſtopt up the heads of the appending nerves, and ſhut out the paſſage of the Spirits: to wit, becauſe other narcotick and more thick, had joyned themſelves to the exploſive particles.

The Curatory Method againſt the Convulſive Diſtempers in Children.

IT is to be endeavoured either to prevent the Convulſive paſſions, threatning Children and infants, or to cure them being already begun.

The Preſervation of Infants from Convulſions.

For if the former children of the ſame parent, were obnoxious or liable to Convulſions, that evil ought to be prevented timely, by the uſe of of Remedies to thoſe born after. It is uſual for this end, to put into the mouth of the child newly born, ſome antiſpaſmodick Remedy, aſſoon as it begins to breath: from hence ſome are wont to give them ſome drops of the pureſt hony, others a Spoonful of Canary ſweetned with Sugar, and ſome again oyl of Sweet Almonds freſh drawn,to ſome may be given half a Spoonful of epileptic water, or one drop of oyl of Amber.

Beſides theſe firſt things given to Infants, which certainly ſeem to be of ſome moment, certain other Remedies and means of Adminiſtrations ought to be uſed: to wit, let one ſpoonful of Liquor proper to this diſtemper, be drunk twice a day: as for example: Take of the water of black Cherry and of Rue each an ounce and a half; of the *Antiepileptic of Langius* one ounce; of the *Syrrup of Corral* ʒ vi. of prepared *Pearl*, *gr.* xv. mix them in a Viol. On the third or fourth day after the birth, let an Iſſue be made in the nape of the neck, then if it be of a freſh countenance, let a little blood to about an ounce and a half, or two ounces be taken by the ſucking of Leeches, from the jugular veins, having a care leſt the blood ſhould flow out too plentifully in its ſleep; let the Temples, and the hinder part of the neck be gently rub'd with ſuch a like oyntment. Take of the oyl of Nutmegs by expreſſion ʒ ii. *of Capive* ʒ iii. *of Amber* ϑ i. Let an Amulet be hung about the neck, of the roots and ſeeds of the greater *Pæonie*, a little of the hoof of an *Elke* being added to it.

The Method of Curing to be uſed to the Nurſes.

Moreover antiſpaſmodick Remedies, ſhould be daily given to the Nurſe; let her take morning and evening, a draught of whey or poſſet-drink, in which the roots and ſeeds of the male *Pæonie*, and ſweet fennil ſeeds are boiled. Take of the *Conſerve of the flowers of Betony*, of the male *Pæonie*, and of Roſemary each ii. ounces; of the powder of the Root and flowers of the male *Pæonie*, each ʒ ii. of red *Corall*, prepared, and of the whiteſt *amber*, each ʒ i. of the roots of *Angelica*, and *Zedoarie* prepared each ʒ ß. with what will ſuffice of the *Syrrop of Pæonie*, make an Electuarie; let her take morning and evening, the quantity of a Nutmeg.

Take of the powder of the *root* of *male Pæony* ʒ ii. the *ſeeds* of the ſame ʒ i. make a powder; of the whiteſt Sugar three ounces diſſolved in the water of the *flowers* of the *Line-tree*; and boiled to tablets, of the *oyl of Amber* ϑ i. make tablets according to Art, each weighing ʒ ß. let her eat one every ſixth hour. Alſo let her keep to an exact diet.

The Cure of Infants ſick with Convulſions.

If any Infant be actually afflicted with Convulſions, becauſe that an Iſſue operates little and ſlowly, it will be expedient to apply bliſtering plaiſters to the nape of the neck and behind the ears, and unleſs a more cold temperament ſhould gain-ſay it, let blood be drawn with Leeches from the veins: let Liniments be uſed about the Temples, Noſtrils, and hinder part of the Neck, and plaiſters alſo laid to the bottoms of the feet; Clyſters that may keep down the belly, ſhould be daily adminiſtred: beſides let ſpecifick Remedies be inwardly taken, often in a day, to wit, every ſixth or eighth hour.

Oyntments.

Take of the *oyl Capive*, of *Caſtor* each ʒ ii. of *Amber* ʒ ß. make a Liniment.

Take of the plaiſter of *Oxycrocia* two parts, of diſſolved *Galbanum* one part, of *oyl of Amber* ϑ i. make a plaiſter for the ſoles of the feet. Let there be given of the powder of *Ammoniacum*, according to the deſcription of *Riverius*, twice or four times in a day.

Powders.

Take of *humane skull* prepared, of the *ſeeds* of *Pæony*, of an *Elks claw*, of *Pearls* prepared, each ʒ ß. of *Amber greeſe*, gr. vi. make a powder; the doſe vi. grains, in a ſpoonfull of the Liquor hereafter deſcribed, three or four times in a day.

Or

Or take of *humane Skull* prepared, of pearls each ʒß. of the *Salt of Amber* ℈ i. of the *Sugar of Pearl* ʒ i. the dose ℈ ß.

Or take of the *Spirits of harts-horn* iii. drops, let it be given every sixth or eighth hour in a spoonful of the Julup below prescribred.

To the children of the poor, may be administred the *powder* of the *Roots* of *wild Valerian* ℈ ß. to ℈ i. let it be given twice a day, in a spoonful of milk, or appropriat Liquor.

Untzerus greatly commends the Gall of a sucking Whelp, to wit, that the whole juice of the gallie Bag being taken forth, be given to the child to drink, with a little of the water of the *flowers* of the *Tile*, or *Line-tree*.

A learned Physitian lately told me, that he had known many cured with this Remedy: Besides, Empericks are wont to cause the bigger children, after they have drank the gall, to eat also the Liver of the Whelp broiled.

Julups, distilled waters, and other appropriat Liquors, may be prepared, after the following prescripts. *Liquors.*

Take of *black Cherry water* three ounces, of the *Antiepileptical water* of *Langius*, one ounce, of perlate sugar, ʒii. mix them.

Take of the green *Roots* of the *male Pæonie* cut into little pieces, six ounces, of *Hungarian Vitriol* eight ounces, of *humane Skull* two ounces, of the *Antiepileptical water* of *Langius* half a pint, mix them, and let them be distilled in a glass retort, in hot sand, the dose i. spoonful to ii.

Take of the fresh roots of the *Male Pæonie* cut, four ouuces, being bruised in a Marble Morter, pour to them of Spanish-wine, *lib.* i. make a strong expression, add of *manus Christi* pearled, half an ounce, let it be kept in a close glass. The dose i. Spoonful, or ii. twice in a day.

When Convulsive motions happen by Reason of the difficulty of breeding Teeth, this Symptom as it is secondary and less dangerous, so the cure does not always require the first or chief labour of healing, but sometimes we are rather careful to remove it, by allaying the pain and the feverish Distemper; wherefore both the patient and the Nurse ought to use a slender and refrigerating Diet; the Teeth being about to break through the Gums, their passage should be made easie, by rubbing or cutting them; and also *Anodynes* should be applied to those swelled and grieved parts: Clysters and taking away blood are often used; it behoves to cause sleep, and to attemper the fierceness of the blood: sometimes antispasmodick Remedies are made use of, but the more temperate, and such as do not trouble the blood and humors, Vesicatories or blistering plaisters, because they aptly evacuate the *serum*, too much poured forth on the head, oftentimes bring help. *Convulsions by reason of breeding of Teeth.*

When childern are troubled with Convulsions, not presently after they are born, nor by reason of the cutting of their Teeth, but for other occasions and accidents; the cause of such a distemper, for the most part, subsists either in the head, or some where about the Viscera of Concoction. When the former is suspected as it is wont to be manifested by signs which argue a *Serous Colluvies*, too much heaped up within the Head, the former Remedies, already recited, ought to be given in a larger dose; besides, in those who are able to bear purging, sometimes a Vomit, or a light purge is prescribed: *Wine* and *Oxymel* of *squills*, also *Mercurius Dulcis*, *Rhubarb*, and *Resin* of *Jalop*, are of approved use. *Spasms or Convulsions caused from other occasions.*

As often as the cause of the Convulsive Distemper seems to be in the *Viscera*, either Worms, or sharp humours, stirring up the torments of the belly, are understood to be in fault.

Against Worms, a purge of *Rhubarb*, or *Mercurius Dulcis*, the *Resin* of *Jalop* being added, is ordained: sometime past, a Child being miserably afflicted with Convulsions that he seemed to be just dying, I gave him a dose of *Mercurius Dulcis* with *Resine* of *Jalop*; with his stools, which were four, he voided xii. worms, and presently grew well. *By reason of worms.*

Take of the *root of Virginian Snakeweed*, in powder ʒ i. of *Coral calcined* to a *whiteness* ʒß. a powder ʒ i. the dose from half a *scruple*, to one *scruple*, twice in a day, continued for three days, drinking after it a decoction of *Grass-roots*. Take of the species of *Hiera* ʒ i. ß. of *Venice-treacle* ʒ ii. make a plaister for the bottom of the belly, or apply to the Navel a plaister.

If the Convulsive motions are suspected to proceed from an irritation of the Ventricle, and intestines, made by sharp humours, a gentle purging, either by vomit, or stool, or both successively ought to be. For this end, let them drink a gentle Emetick of wine of squills, or salt of vitriol; when even the sick are troubled with a striving to vomit of their own accord: but if the other evacuation, or downwards, shall seem better to be tried, they ought to take an Infusion of *Rhubarb*, or the powder, and *Syrrup* of *Succory* with *Rhubarb*, or of *Roses* with *Agaric* and very often by these Remedies, timely applied, I have seen the Convulsive Distempers in Children

to be cured: besides, in this case, Clysters are frequently used: but external Medicines are not to be omitted; to wit, Fomentations, Oyntments, Plaisters applied to the Belly.

Take of the *flowers* of *Cammomel* cut very small, two handfuls, let them be put into two little bags made of fine Linen, or Silk, which being dipped in warm Milk, and wrung out, may be applied successively to the abdomen, or lower region of the Belly.

Take of the tops or flowers of *Mallows*, in like manner, but small, let them be fried in fresh Butter, or Hogs Lard, and in the form of a Liniment, or a Cataplasm, applied to the Belly.

CHAPTER V.

Of Convulsive Diseases of Ripe age, arising chiefly by reason of the Nervous origine being affected.

ALthough Convulsive Distempers, which happen to those of riper years, being known by other Names, also are commonly reputed of some other stock, and are wont to be referr'd to the Passions called Hysterical, Hypochondriacal, or Colical, or to the Scorbute; yet if the matter be a little better considered, it will easily appear, that some Convulsive symptoms, both in Men and Women, do come from the brain, which Convulsions properly and truly challenge to themselves the Name: But these (as we have already mentioned) may be distinguished after a various manner, by the manifold seat of the Morbifick cause, but chiefly into these three kinds, *viz.* Into Spasms or Convulsions stirred up, by reason of the origine of the Nerves being chiefly affected; into others being stirred up, by reason of the extremities or ends of the Nerves being possessed by the Morbifick matter; and lastly, into such from whose head the Morbific Matter descending, fills the whole passages, or the most part of some certain Nerves, or of all together.

Three kinds of Convulsions happning to those of riper years.

Therefore, that we may proceed to unfold the Convulsions arising from the beginnings of the Nerves being affected, take notice here, that the Morbifick matter besieging the beginnings of the Nerves, doth sometimes chiefly flow into the first pair of Nerves, to wit, which respect the Muscles of the Eyes and Face, and from thence the contractions and tremblings, now of the Nose, Cheeks, or Lips, now of the Eyes, or the distortions of the Mouth, follow. Secondly, Sometimes the wandring and intercostal pair do chiefly imbibe the Heterogeneous Particles; and then Inflations, or Contractions of the Abdomen and Hypochondria, and also the palpitation of the Heart, trembling, difficult and interrupted breathing, an intermitting pulse, and other symptoms of the middle, and lower Belly, do very much infest. Thirdly, But sometimes the Morbifick cause being placed lower, affects chiefly the spinal marrow, and therefore the outward members and limbs, are rendred obnoxious to inordinate leapings forth and contractions: Further, in very many cases of this nature, because the animal spirits being explosed about the origine of the Nerves, do inordinately leap back towards the *Encephalon*; for that reason, to all Convulsions almost being excited by this means, the *Vertigo*, also the scotomie or giddiness, the tingling of the Ears, and sometimes the amased insensibility or falling down of the spirits, are joined, or follow.

Distempers arising from the Nervous origine distinguished.

1 According to the various Nerves being affected.

2. According to the various places of the same Nerves being affected.

But as we may conjecture, from the various figures of the Convulsive Distemper, it seems, that the Convulsive matter hauling those, or these Nerves, or many of them together, is lodged either about their beginnings, only, so that the spirits in that place being often explosed, a frequent and very troublesome Vertigo arises, besides tremblings, and a short faintness about the *Præcordia*, swoonings and often leapings, and light contractions in the Viscera, or Muscles are felt. Or, Secondly, The explosive Particles being dilated to the beginnings of the Nerves, enter more deeply into their processes, and not seldom being slidden down into the Nervous foldings, belonging to the *Præcordia*, or the *Viscera* of the lower Belly, or also to the exterior members, procure there other as it were nests of Convulsive Distempers, that as often as the spirits about the Nervous origine are driven into explosions, presently fits, as it were Hysterical, Asthmatical, or otherways Convulsive, arise in the Abdomen, Thorax, or Limbs: Examples of these, and by what means they are made, shall be anon more clearly delivered: In the mean time, the Spasmodic matter flowing into the pipes of the Nerves, when

when it is transfer'd even to their processes and remote enfoldings; yet, forasmuch as it hath still its chief mine about the Nervous original, therefore after very grievous Convulsions of the Viscera or Members, a great perturbation of the Brain follows thereupon, with a tingling of the Ears, a Vertigo, and often an insensibility or amased excurtion of spirits: but sometimes the Morbific matter, as to the greatest part, being translated to the fartheſt ends of the Nerves, from thence they become free or clear about their beginnings: For I have observed many, who, whil'st at the beginning, they were infested with the Vertigo, often fainting away with fear, head-ach, and heavinesse about the hinder part of the head, to have felt about the *Præcordia* or *Viscera*, only light inflations or tremblings; but afterwards, suffering more cruel Convulsions about these parts, they did not complain of the former Distempers of the Head.

By what means the Convulsive matter flows into the Nerves.

If it should be further demanded concerning the Convulsive matter, from what place it should be brought, and by what ways carried towards the beginnings of the Nerves, and what kind of settlement, and as it were cherishing nests it there obtains; we say, that although we cannot detect the footsteps and manifest passages of this matter, yet so much may be collected from certain observations, and the Analogie of things, it may be supposed there are these two distinct manner of passages, whereby the Convulsive Particles being first poured out into the Brain and Cerebel, from the Blood, are from thence carried towards the beginnings of the Nerves, *viz.* First, sometimes this matter being imbibed by the Brain and Cerebel, and by degrees passing thorow the pores of either, slides into the trunk of the oblong marrow, whose tract being also overcome by it, together with the nervous juice, it slides forward towards the original of the Nerves, and is heaped up near their heads, or within the medullarie trunk it self, or within the annularie Prominencies, in which places, either a long while subsisting, it stirs up frequent *Vertigoes*, and more light Convulsions, in remote parts as hath been said; or being slidden from thence, more deeply into the passages of the Nerves, excites fits of Convulsions very cruel: such a progress of the Morbific cause, we suspect in whom the vertigo, swooning, heavinesse of the head, and torpor of the mind go before the Convulsive assaults: Indeed, the matter of the Disease, abounding as yet in the brain and marrowie appendix, produces these kinds of previous Distimpers; which being slidden from thence into the Nerves, causes Convulsions.

Secondly, There is yet another way, whereby it plainly appears, that the material cause of the Convulsive Distemper is transferred to the beginnings of the Nerves, to wit, when the same being deposited by the *serous water* within the cavities or ventricles of the Head, it is insinuated into the neighbouring roots of the Nerves: For in *Chronical* Diseases, when the remarkable discrasie of the blood and humors happens also to be accompanied with a praved disposition of the brain, oftentimes a great plenty of sharp *Serum* infesting the Nervous stock, dropping forth from the Vessels of the *Choroeidan*, or retiform enfoldings, slides into the ventricles of the brain, and its appendix: But this *serous water*, afterwards breaking thorow the under-spreading of the *Cerebel*, into the fourth Ventricle, the little skin there being displaced, whereby the oblong marrow is uncovered, it falls upon the beginnings of one or more of the Nerves, and either by irritating, or imbuing them, with Heterogeneous and Explosive Particles, induces the Convulsive disposition. And this for the most part is the cause that sick people, after long and ill handled Fevers, also after the more grievous *Cephalic* Diseases, at length die of Convulsions; as I have found by the frequent Anatomie of the Carcases of those who died by that means. Also it appears by Anatomical observation, That the brain may be overflowed by a certain *serous water* without the Distemper of the Convulsive disposition; and further, that in some, who died of the Epilepsie, and other Convulsive Diseases, there was no deluge of the *Serum*, within the Ventricles of the Brain: by which it is given us to be understood, that the Convulsive Distempers do not flow only from the watery matter in the Head; but that they arise not at all from such a cause, unless the *serous* water overflowing the Ventricles of the Brain, and chiefly that underlaying of the *Cerebel*, be imbued with Heterogeneous and Explosive Particles. I remember once, my Counsel to be ask'd for a young man labouring with an egregious Phtisis, and at that time truly desperate, besides a Cough, and shortnesse of Breath, he had grievously complained for many days, yea weeks, that he could not lie upon his back in his bed, or whilst he sat in a Chair he could not lean his head backwards: for that by this, or that posture of his Body, he was wont presently to suffer tremblings of his heart, and a fainting of the spirits, as if he were just about to die: wherefore of necessity he was fain to hold his head upright, or leaning forward. After he was dead, his Carcase being dissected, his Lungs appeared all over tumified, and in some places Ulcerated: then his Skull being opened, there flowed within all the *Ventricles* of the brain, a great quantity of yellow and salt *Serum*: which

which water certainly whilst it did slide forward upon the fourth *Ventricle*, about the trunk of the oblong marrow, his head leaning back, rushing upon the heads of the wandring and intercostal pair of Nerves, did stir up the aforesaid Convulsions about the *Præcordia:* but so long as his head was inclined forward, that the heap of *Serum* flowed back into the interior *Ventricles* of the Brain, the origine of the Nerves remained free from that Convulsive matter.

Having hitherto shown how many ways, and by what passages the morbific matter, being dilated towards the origine of the Nerves, seems to bring on Convulsions, it were easie, according to these reasons, to unfold many Convulsive symptoms: for besides the Convulsive motions of Infants and Children, oftentimes excited from the same kind of causes; hither may be refer'd the contractions, and sudden leapings forth of the nervous parts, which follow upon Fevers. As also those Passions commonly called *Hysterical*, also *Hypocondriacal*, and certain others, proceed not seldom from the *Morbific* cause, rushing upon the beginnings of the Nerves. We will therefore endeavour to establish the truth of this *Hypothesis* by some other Histories and examples of sick people; but in the first place, we will propose observations of that kind, in whom the Morbific matter setling upon the beginnings of the Nerves, and not being as yet slid deeply into their proeesses, induced frequent *vertigoes*, and only more light Convulsions of the *Viscera* and *Præcordia*.

1 *Observation.* A Noble Woman about 30 years of Age, of a tender constitution, and lean in Body, was wont every winter to be grievously afflicted with a *Catarh* or Rhume flowing upon the wind-pipe and Lungs, with a hoarse Cough, and great spitting; but the last year, great care and diligence being used, she avoided that evil. But after the winter Solstice, having taken cold, she was troubled with an huge pain of the head, a tingling of the Ears, a giddiness, with a great defluxion upon the Eyes, that it easily appeared, that the heap of *Serum*, which before this time was wont to distil into the Breast, was now wholly laid up, within the head and brain: besides, an effect of which was, that as often as she began to sleep, she was greatly infested with Passions, as it were *Histerical*, to which she had never been before obnoxious: For when ever, being sleepy, she closed her Eyes, presently a bulk ascending in her belly, a choaking in her throat, tremblings, and leapings about the *Præcordia*, were stirred up; which affections notwithstanding quite ceased, when she was thorowly awakened, so that the sick party was necessitated to abstain almost altogether for many days and nights from sleep.

Being sent for to this Lady, after she had been sick and weak for many days, I was compelled at length to use gentle Medicines: therefore I took care that blood should forthwith be drawn from the foot, to four Ounces, and every day a Clister of Milk and Sugar to be administred, by which she was wont to have three or four stools: besides I gave her every eighth hour a Dose of the spirits of *Harts-horn* in a spoonful of the following *Julup:* Take of the water of *Penny-royal*, of *Walnuts*, and *black Cherries* each four Ounces, of *Histerical water* two Ounces, of the Syrrup of *Clove-gilliflowers* an Ounce and a half, of *Caster* tied in a little knot, and hanged in the middle of the glass half a Dram, of the Powder of Pearls one Scruple, mingle it. I caused with success a *vesicatorie* to be put behind the Ears, and a *Cataplasm* of the leaves of *Rue* and *Cuccoe-pint*, with the *Roots of Bryony*, *Bay-salt*, and *black soap*, to be laid to the soals of her feet. Sometimes I gave her in the evening in a little draught of the prescribed julup, half an ounce of *Diacodium*, to which succeeded a moderate sleep, without the wonted Convulsions following: which kind of effects from opiats exhibited in the like case, I have often experimented: for the quenching her thirst I gave her a *Ptisan*, with diuretick Ingredients boiled in it: by the use of these, she was very much eased, in a short time. But what proved a great benefit to her, was, that an Impostume in her ear, breaking of its own accord, poured forth, at first a yellow matter, and afterwards for many days, a great plenty of thin *Ichor* or *Excrement*, by which Evacuation, the Convulsions of the *Viscera* and *Præcordia* wholly ceasing, the disease was perfectly cured.

As to the Reason of the aforesaid sickness, without doubt, it seems, that those Distempers were excited by the serous colluvies, laid up within the bounds of the Head: for the translation of that humor into the head, brought at first both the Disease, and the Secretion or flowing of it out, thorow the Emunctuaries of the ear, took away all the Symptoms: Besides, when the morbifick matter had brought in to the spirits, planted about the beginnings of the nerves, a disposition somewhat explosive, they, though being struck as it were with madness, they were continually troubled, yet so long as leaping back towards the brain, they obtained a space, in which they might be more freely expanded or stretched forth, they did indeed only more vehemently exercise the Phantasie, and without farther trouble did only cause watchings. But when by sleep

sleep sometimes creeping upon her, the excursion of the unquiet Spirits were restrained towards the Brain, (which indeed necessarily happens, when we sleep, the nervous Liquor within the pores of the brain, at that time being more plentifully admitted) they tumultuarily rushing upon the heads of the wandring pair, and intercostal Nerves, troubled the whole *series* of Spirits, flowing within the passages of those Nerves, and so caused the aforesaid Convulsions, about the *Præcordia*, *Viscera*, and muscles of the throat. I have known many both Men and Women sick after this manner, who when they have been troubled with an headach, an heavinesse of the hinder part of the head, or a *Vertigo*, have while they slept, felt forthwith in their *Præcordia*, or *Viscera*, or in both together, perturbations as it were Convulsive; which indeed happens from the bending downward of the tumultuating Spirits, being reflected from the brain, upon the beginnings of the Nerves: But that the use of opiats, brought a pleasing sleep to this sick person, without the wonted Convulsions, following, the reason was, because the animal spirits, as unquiet and furious as they were, yet by the Intanglement of the Narcotick Particles, they were bound as it were in Chains, that afterwards, without any resistance they were overcome by sleep. I have indeed very often happily cured, most grievous fits of Convulsions, both Asthmatical, and as it were Hysterical, by administring Opiates.

An honest woman M. G. of 67. years of Age, yet of a florid countenance, and fat in body, when she had been a while obnoxious at first to a swelling of the face, and very grievous fits of the headach, she fell through the great cold of the winter, into a very troublesome *Vertigo*, with a trembling of the heart, a fainting away of the Spirits, and a frequent striving to vomit: being layed in her bed, if she opened her eyes, or turned her from one side to another, she was presently troubled with a notable gidinesse, or swimming in the head, with swooning and effectless vomiting. Visiting this woman, I doubted not, but that the cause of her sickness was, the Convulsive matter, being translated from the exterior region of the head, to the most inward recesses of the *Encephalon*, by whose inspiration or heterogeneous *Copula*, the animal spirits being touched while they leaped forth inordinately towards the brain, they excited the vertiginous Distemper, and while they rushed tumultuarily upon the heads of the nerves, the Scotomie, disorder of the *Præcordia*, and endeavouring to vomit: A large Vesicatory or blistering Plaister, being applied to the nape of the neck, and behind her Ears, Clisters daily administred, also the use of *Spirits of harts-horn* frequently, and of a Cephalick Julup, cured her within a few days. 2. *Observation.*

A noted man about 33. years of Age, when he had been for a long time subject to a Cough, with great and thick spitting, besides having the pores of his skin very open, he was wont to sweat continually, and every night to be wet with it: about the beginning of the spring, he perceived those usual evacuations to happen more sparingly; in the mean time, he complained of a fulnes of his hands and feet, and as it were a certain swelling or puffing up, so that he feared a dropsie was coming upon him; besides he was troubled in his head, with a giddinesse and frequent *Vertigo*: A little after, this evil increasing, light contractions, and sudden Convulsions, were ordinarily excited about his Lips, and other parts of the mouth and face; also presently after (the morbific matter as it should seem, flowing upon the beginnings of the wandring pair and interçostal nerves) he was afflicted with the trembling, and leaping of the heart, with frequent fainting away of the vital spirits, as if a *Leipothemy* or swooning was falling upon him. 3. *Observation.*

I know that very many ascribe these Convulsive passions, so grievously infesting the *Præcordia*, to the vapours rising from the spleen: but it seems much more reasonable to deduce them from the Convulsive matter laid up within the brain, and rushing upon the beginning of the Nerves; because a shifting or translation of some excrements, from some other parts, to the head, goes before, and that it is so laid up, within the compass or bounds of the *Encephalon*, the almost continual vertiginous distemper, and the Convulsions of the parts of the mouth and face, testifie it plainly: wherefore I thought good to prescribe to this man Remedies according to the method hereafter shown.

I might be able here to propose many observations of this nature, in whom the morbific matter, subsisting near the beginnings of the nerves, stir up light Spasms or Convulsions only of the *Viscera* or members with a *Vertigo*. But because a portion of this matter, descending from the head, enters more deeply the pipes of the Nerves, and so strows the tinder or enkindling of explosive seed, as it were gunpowder, about their middle and ultimate processes and enfoldings, it will be to the purpose to add some examples of this kind.

A certain young maid E. L. tall and handsome, sprung from sound parents, and her self (as far as might be perceived) originally healthful, after she had served a master long sick, being a long time, and almost continually with him, and was forced to watch whole nights very often, and also at other times, so that she never slept but short and interrup- 4. *Observation.*

terrupted naps; she at length begun to complain of an heavineſs in her head, and a frequent *Vertigo*: within a little time after, the distemper growing worse, she felt tremblings in her whole body, with a light shaking of her members, which came at certain times, tho wandring and uncertain: afterwards she suffered fits plainly Convulsive, and those horrid, and often Infesting: a little before the approach of the disease, she was afflicted with a short *Scotomie* or swimming in her head, by and by she felt a streightneſs, and great oppression of her Breast, whereby all her *Precordia* were drawn together: then presently gnashing her teeth, and giving a great groan, she was wont to fall to the ground, in the mean time she was sensible, but labouring with the great oppression of her heart, till that constriction of her breast was loosned, she was not able by any means to rise; afterwards, when the fit was past, she was disturbed a good while, with a great palpitation of the Heart, an heavineſs of the senses, and a great debility of the animal function. After that this Sick maid had lived subject to these kind of fits, being very often repeated, for about 14. months, she at last became Epileptical, that as often as the assault of the evil rerurned being flung prostrate on the Earth, she was taken with the Insensibility or amazedneſs of Spirits, with the foaming at the mouth, and other peculiar symptoms of the falling sickneſs. Neither did this distemper stay here, but ere the space of a year was elapsed, it degenerated into madneſs, that at last the sick maid, having lost the use of her Reason, grew sometimes mad with fury, and sometimes was plainly stupid and foolish.

The reason of the aforesaid Case.

It is plain from the beginning, progreſs, and often *metamorphosis* of this Disease, that it at first had its cause and seat in the head, near the beginning of the Nerves, and from thence did daily unfold more largely its bounds, both into the brain, and nervous System; for from the beginning, the morbific matter consisting near the beginnings of the nerves, caused only lighter Spasms or Convulsions of the *Viscera* and members, and shakings, with the *Vertigo*; afterwards a portion of it being slidden into the pneumonic nerves, and their foldings, produced most grievous Convulsions of the *Præcordia*, *Diaphragma*, and *Ventricle*; and also another portion of the same matter invading the brain, and its marrow, caused the Insensibility or Amazedneſs, and so the fits of the Falling-sickneſs; and at length, the texture of the spirits being wholly vitiated, and their *Latex* being degenerated into a most sharp, and as it were Stygian Liquor, the Convulsive distempers passed into madneſs.

Therefore, as to the particular reasons, both of the disease, and symptoms, it seems, that the aforesaid Virgin, by her sedentary Life, (she being deprived altogether of the exercise of the body, and the use of a more free air) but chiefly by her nightly watchings, and being frequently interrupted of her sleep, she had contracted a vitious disposition of the blood and humours, and also a praved and weak constitution of the brain, and Nervous stock (to which may be added, that she did perpetually attend on a Master, sick of most grievous distempers of Convulsions, and by that means had received perchance some contagion, or convulsive infection: and first of all indeed, the Heterogeneous Particles being poured forth, together with the nervous juice, into the brain and Cerebel, and there cleaving to the spirits, as it were skirmished with the preliminarie scotomie, and vertigenous distemper; then the convulsive matter, setling upon the beginnings of the wandring pair, and intercostal Nerves, and the spinal marrow, brought in, with the *Vertigo*, the leaping of the *Viscera* and Muscles, and their lighter shakings: Afterwards when entring more deeply the pipes of the Nerves, it was carried into the Cervical, and Cardiac, and perhaps intercostal, and other unfoldings, and embued the spirits, performing the office of respiration, and the pulse, with an explosive *Copula*; they being brought into explosions at every turn together with their superiors, inhabiting the nervous origine, by reason of fulneſs, or becauſe of irritation, excited most horrid Convulsions of the respective parts: But the fit growing strong, from the pneumonic or breathing Nerves being strictly bound, the sudden inordinate systole of the Thorax was stirred up; then presently the *Diaphragma* being suddenly and vehemently drawn back, the obstreperous ejaculation did succeed: Further, when by reason of the systole of the Thorax, being sometime continued, the blood being hindred, that it could not move, it *stagnated* altogether in the *Præcordia*, therefore, during the fit, that great oppression of the heart, with want of speech and motion afflicted the sick Maid: But in the mean time, while as yet the region of the brain remained free and clear from the explosions of the spirits, the sick party remained in her senses, or memory: but afterwards when the Convulsive matter being daily increased, it was unfolded in the middle or marrowy parts of the debilitated and broken brain, to the former passions; about the *Præcordia*, came also the insensibility and amazedneſs of spirits, then the Epilepsie, and lastly madneſs, for the reasons before recited. Many Medicines, and of various kinds, being prescribed to this sick Maid, by many, both Physicians and Empericks,

ricks, but confuſedly, and with an uncertain method, being preſently changed, did her no good.

A certain fair woman, well coloured, and well fleſh'd, from a ſetled grief, fell into a ſickly diſpoſition; about noon, and the evening, for the moſt part ſhe was pretty well, but in the morning when ſhe had ſleep enough, and often indulged it too much, till ſhe became very ſomnolent and heavy: being thoroughly awakened, preſently ſhe was wont to complain of a heavineſs, and as it were a ſtupidneſs in her whole head, with a *Vertigo* at every motion, or ſtirring about of her head; a little after ſhe conſtantly expected a Convulſive Fit, or the inſenſible amazedneſs of the ſpirits, and ſometimes this, ſometimes that, was wont to infeſt her: for that after the *Vertigo*, as it were a *prævious Vellication*, for the moſt part, ſhe felt in her ventricle, and left ſide, an heavy or weighty pain running up and down here and there; hence belching, a ſtriving to vomit, eruptions of blaſts, alſo wonderful diſtentions of the abdomen, and hypochondria, did follow, and ſometimes for many hours, did miſerably exerciſe this Woman; but ſometimes theſe Symptoms hapned to be wanting, and then the diſtemper more cruelly afflicted her brain: for falling into frequent inſenſible fits, ſhe was wont to continue a great while immovable, and with her eyes ſhut, without ſenſe or unſtanding; and when her ſervants had moved her by rubbings, and with the fume of Tobacco, ſhe came by and by to her ſelf, but preſently again ſhe fell into the like inſenſibility, and ſo for four or five times, before ſhe could perfectly recover her ſelf, and be without expecting to fall into theſe fits again: At length the Tragedy being acted, ſhe remained however affected with an heavineſs and torpor of head, in ſome meaſure: but about noon, all the clouds being diſcuſſed, ſhe was wont to obtain a fair, and ſerene diſpoſition of her whole head, until the next morning, the ſame Symptoms would return again. 1. *Obſervation.*

Who ſhall rightly weigh theſe Symptoms, need not ſuppoſe them vapours, ariſing from the Womb or Spleen, and in thoſe ſeek for the morbific cauſe in vain: which truly may more certainly be placed in the head it ſelf: for it ſeems, that by reaſon of a great ſadneſs (which happens often to women) at the beginning, a great debility, together with a vitious taint, was impreſſed on her brain; ſo indeed that the animal ſpirits derived to the brain and Cerebel, brought with them heterogeneous particles of a mixt kind, *viz.* Partly narcotick or ſtupifying, and partly exploſive or ruſhing forth: which kind of Copula, when they had more plentifully conceived, through ſleep they were ſtirred up to the ſhaking of it off, by mere fulneſs: as ſoon therefore, as the woman was awakened, the ſame ſpirits being moved, either a bending downward being made below, they were depreſſed upon the beginnings of the Nerves, and there being exploſed, they excited Convulſions of the *viſcera*; or leaping back towards the middle of the brain, and being there ſtruck off, they brought in thoſe frequent and terrible Inſenſibilities. In truth, this diſtemper was ſomewhat akin to the Epilepſie, but that the morbific matter was not as yet ſtayed within the regal palace of the brain, or its middle part, ſo that there it might infect the ſpirits within the fountains; but yet the ſame heterogeneous Copula, did cleave more ſtrictly to them, diſſociated or disjoined below, and dividing themſelves into various and leſſer rivolets according to the beginning of the nerves. In the mean time, the ſpirits, whereby they might ſhake off that matter, being often exploſed, cauſed the ſtupor and inſenſibility, but bending to ſome other place, they ruſhed upon the beginnings of the nerves, for that reaſon cauſed thoſe Spaſms or Convulſions of the *viſcera*: but that the fits come only in the morning after a plentiful ſleep, the reaſon was becauſe the heterogeneous Copula of the ſpirits, coming to them with the nervous juice, was at that time gathered together to a fit fulneſs for exploſions, which being then wholly ſhaken off, the ſick perſon remained therefore all the reſt of the day free from the diſtempers, till the next day, when the night Sleep had brought to the head, a new ſupplement of morbific matter, the like fit returned in the morning, which perhaps, as the Sleep had been ſhorter or longer, was moved now within the brain, now near the nervous origine.

An Obſervation of a diſtemper as it were hyſterical in a man.

But it may be obſerved, that Convulſions have ariſen from the nervous origine, being chiefly affected, not only in the female ſex, as the weaker and more liable, but ſometimes theſe kind of diſtempers have been excited in men from the like procatartick cauſe. Some years ſince, being haſtily ſent for from a ſtranger, who lodged in this City, at firſt ſight, I ſuſpected that he was poſſeſſed, and believed that he had more need of Exorciſms, than of Medicines. He was about Forty years old, who had now for about three years, at certain ſet times of the year, been wont to be troubled with convulſive Motions; whilſt he by chance lodged here for a few days about his occaſions, by reaſon of a great ſadneſs, he had a fit of his ſickneſs greater than uſual: He was wont for two or three days beforehand ro feel the coming of his diſeaſe; to wit, from a great

commotion within the forepart of the head, almoſt a continual *Vertigo*, and frequent dimneſs of his eyes: But the fit coming on him, at firſt his eyes were variouſly roled about, and inverted, then a certain bulk, like a living animal, was ſeen to creep from the bottom of his belly upwards, towards his heart and breaſt, and from thence to his head; I my ſelf preſſing his belly with my hand, felt very plainly this kind of motion, and as long as I hindred this round thing from aſcending with both my hands, and all my ſtrength, he found himſelf indifferently well; but as ſoon as this ſwelling creeping upwards by degrees, had reached the head, preſently the members of the whole body were cruelly pulled together, that he would daſh himſelf againſt the walls or poſts, as if poſſeſt by an evil ſpirit; He could hardly be held, and reſtrained by four ſtrong men with all their force, but that he would leap from them, and fling out his arms, feet, and head here and there, with divers manners of motions: when he ceaſed from leaping forth, or ſtrugling, his Members would be ſtrongly extended, and his muſcles ſtiff, as if troubled with the Cramp or ſtiff extenſion: ſuch a fit would laſt about a quarter of an hour, then coming to himſelf, he would talk ſoberly, and walk about in his Chamber; he knew what he had ſuffered, and asked pardon of the ſtanders by; preſently after he began to draw his eyes inward, and ſwiftly to role them about: then preſently the convulſive diſtemper returning, acted the like Tragedy as before: and after this manner, he would have five or ſix of theſe kind of convulſive fits, within three hours ſpace. In the midſt of one of theſe fits, a vein in his Arm being opened, and a large orifice made, the blood flowed out ſlowly, and was ſeen preſently to be congealed: and ſo indeed, that being received into the diſh, it did not flow about, after the manner of Liquors, with a plain and equal *ſuperficies*, but like melted ſewet, dropped into a cold Veſſel, one drop being heaped upon another, it grew to a heap.

The reaſon of the aforeſaid Caſe.

If this ſtrange diſtemper had hapned to a Woman, it would preſently have been ſaid that it was the Mother, or Hyſterical, and the cauſe of it would have been laid on the fault of the Womb; eſpecially, for that the aſcent of ſomething, like a bulk, began the fit, from the bottom of the belly: But when this common ſolution, which moſt often is the mere ſubterfuge of Ignorance, cannot be admitted in this caſe, it ſeems moſt congruous to reaſon, to refer all theſe Symptoms to the evil affections of the brain and nervous Stock. For truly it may be plainly gathered, that the cauſe of the diſeaſe, did lie hid in the head it ſelf, by the Symptoms preceding the fit, which did denote a very great agitaiton of the ſpirits within the head; that inflation of the brain, and heavy ſwimmings, which conſtantly came juſt as the fit was coming upon him, the turnings of the eyes manifeſtly argue, that heterogeneous and exploſive particles, did adhere to the ſpirits dwelling within the *Encephalon*, near to the beginnings of the Nerves. So that this caſe, comes near to the nature of the Epilepſie, excepting that the ſpirits within the middle of the brain, did not admit an heterogeneous Copula, nor being exploſed in another place, did they tumultuouſly break forth there; for during the fit, the ſick Perſon was ſtill in his ſenſes, or had the uſe of his memory: But the morbific matter, being more plentifully laip up in the head, when from thence it was ſlid, more deeply into the pipes, both of the Interior and Exterior Nerves, it had placed mines of Exploſive ſeeds, very diffuſive in the *viſcera*, both of the lower and middle belly, and alſo in the exterior members, ſo that when the animal ſpirits began to be exploded, near the beginnings of the nerves, preſently from thence others inhabiting the meſenteric enfoldings, and then others in the other nervous enfoldings, interjected from the outmoſt bound, even to the head, being exploſed in order, did even continue the Convulſions, from one part to another, until they came to the head it ſelf: but preſently the exploſion being tranſlated from thence, to the ſpirits dwelling in the ſpinal marrow and Appending Nerves, the moſt ſtrong Convulſions of the muſcles and members of the whole body followed: But that, that aſcent, as it were of bulk, or ſubſtance which very often was perceived in the lower belly, about the beginning of the Convulſions, proceeding from the ſpirits, within the meſenteric enfoldings, being brought into exploſions, ſhall be more largely declared anon, when we come to treat of hyſterick paſſions.

In the mean time if it be asked for what reaſon that the convulſive paroxyſm, beginning in the part of the head, near the beginnings of the Nerves, preſently the ſpirits dwelling in the outmoſt parts (as many as are prediſpoſed for that Symptom) enter into exploſions, and ſo transfer the convulſive Diſtemper, being there fully raiſed upwards, (for it is for the moſt part ſo, whether the entrance of the diſeaſe begins in the bottom of the belly, or about the middle of the abdomen, the *Hypochondria* or *Præcordia*, for that the Convulſion is wont to creep by degres from thoſe places towards the head:) I ſay, for the ſolution of this, theſe two conſiderations are offer'd, to wit, in the firſt place we conſider, that when ſome whole *ſeriei* of ſpirits is diſturbed, thoſe

Wherefore the Convulſions begin from the extremities of the Nerves.

who

who reſide in the extreameſt bounds are firſt deſtituted of their original Influence; wherefore they, before others, grow tumultuous, and begin to grow irregular; hence it is, when the Nerve of the arm or thigh, is ſtrained hard, by leaning on it, that the wonted Influence is hindred, that a numneſs, with a ſenſe of pricking or tingling, is firſt felt in the fingers or toes; from whence by degrees, it creeps upwards towards the places affected. Secondly, the other is, and rather the reaſon of this diſtemper, to wit, that the ſpirits being ready for exploſions, when they are contained within the nervous pipes, one or more, as ſo many diſtinct little Tubes, they require a ſufficient ample ſpace, in which they may be able very much, and indeed ſucceſſively to be rarified and expanded, which thing becauſe it cannot be eaſily performed within the Trunks of the Nerves, from the beginning towards the end, therefore while the Spirits, about the nervous origine, being firſt ſtruck off, leap back towards the *Encephaleon*, for that cauſe they ſtir up the vertigo: the more open exploſion of the ſpirits, for the moſt part, begins about the inferior paſſages of the nerves, or at their extremities, where the trunk of the nerve is either dilated into more ample foldings, or terminated in more *fibres* largely diſperſed abroad; then thoſe Spirits being exploded, there is room made preſently for others ſucceeding in order, whereby in like manner they may be exploded: Hence we may obſerve whilſt the exterior Spirits are exploded, if a ligature or hard compreſſion being made, the ſucceſſion of others into the ſame ſpace or their progreſs toward the exterior parts be intercepted, the Convulſion is wont to be hindred, that it cannot aſcend upwards, wherefore when a numbneſs (as medical Hiſtories teſtifie) being ariſen from the fartheſt end of the finger or toe, creeps to the ſuperior parts, with a tingling, or like a cold air, and at length reaching the brain, cauſes moſt horrid Convulſions; if by and by after the motion is begun, the Arm or Thigh be ſtrongly tied, the Spaſm or Convulſion not being able to get over the bound place, is hindred from coming to the head; yea, it is uſual for hiſterical women, as ſoon as the ſwelling of the belly, or the aſcent of the bulk in the abdomen is firſt perceived, to gird ſtrongly their waiſts with Swathing bands, and ſo oftentimes they prevent the *Præcordia*, and the region of the brain, from being diſturbed by that ſame Convulſive Fit.

Wherefore the blood is ſoon congealed in Convulſive diſtempers.

But that the blood being let out in the midſt of the fit, was ſo ſoon congealed, indeed it very ordinarily happens to be ſo in Convulſive and Apoplectical Diſtempers, as the moſt learned *Heighmore* hath firſt noted out of *Hendochius:* But that ſome from hence contend, that convulſions rely altogether upon the thickneſs of the blood, and ſtagnation, its motion being hindred, cannot be granted: becauſe the blood taken from thoſe who are ſubject to convulſions, a little before the fit, is dilated with *ſerum*, and fluid enough: wherefore we may lawfully think, that the congelation is cauſed by the *paroxſm* it ſelf, becauſe in Convulſive motions, and immoderate contractions of the Nerves, and *Viſcera*, the interflowing blood by the exhalations of its ſpirit and *ſerum*, is ſomewhat looſened in its mixtion, and therefore in ſome ſort coagulated; like as when milk, by reaſon of too much agitation and ſeparation of the parts one from another, grows into butter; wherefore this kind of Coagulation of the blood, ſeems rather to be the effect, than the cauſe of the Convulſions.

The Curatory Method.

AS to the cure of theſe kind of Convulſive Diſtempers, which in women, or men, proceed from the morbific cauſe lying upon the beginnings of the Nerves. The firſt indication will be, to draw away the tinder or inkindling of the diſeaſe, *viz.* to hinder that the blood may not affix on the head, the heterogeneous particles, either begot in it ſelf, or received elſwhere from the *Viſcera*. For this purpoſe an evacuation both by catharticks, and blood-letting, unleſs ſomething contradict, is wont to be beneficially preſcribed.

Emeticks.

Vomiting moſt often brings help, wherefore Emeticks of the Infuſion of *Crocus metallorum*, or of the *Salt of Vitriol*, or *wine of ſquils*, is to be taken at the beginning. Then almoſt the next day, the taking away of Blood, either by *phlebotomy* in the Arm, or by Leeches in the Sedal veins, is to be performed; then afterwards a gentle purge of *pills*, or ſolutive Apozems, is to be ordained and timely repeated.

Purges.

Take of the *pills* of the *Amber of Crato*, or of the *Tartar of Bontius* ʒ ii. of the *Reſine of Jalap*, gr. xvi. of *Caſter* ϑ i. of the *oyl of Roſemary* or *Amber*, ϑ ß. of *gumm-Ammoniac* diſſolved in hyſterical water, what will ſuffice to make 16. pills. Let 4. of them be taken every ſixth or ſeventh day.

Take of the *Roots of Polypodia* of the *Oak*, of *ſharp pointed-docks* prepared, *of Chervil*, each ʒ vi. of the *male Pæony*, ʒ iii. of the leaves of *Betony*, *Germander*, *Chamipits*, *Vervine*, the *male Betony*, each i. handful, of the ſeeds of *Cardamums*, and *burdock* each ʒ iii. let them be boiled in 4. pints of Spring water, till half be conſumed: Let it be ſtrained into a matrace, to which put of the leaves of the beſt *Senna*, one ounce, of *Rhubarb*, ʒ vi. of *Turbith* gummed half an ounce, of *Epithimum*, of *yellow-Sanders*, each ʒ ii. of the *Salt* of *worm wood*, and *Scurvy-graſs*, each ʒ i. the yellow rine of the *Orange* ʒ ii. let them digeſt cloſe ſhut, in hot ſand for 12 hours, let the ſtraining be kept for uſe, ſweeten it (if there be need) with what will ſuffice, of the *Auguſtan* Syrrop, or of *Succory* with *Rhubarb*. The Doſe ſix ounces, once or twice in a week.

Remedies for a more hot temperament.

Every day, in which purges are not taken, Remedies ſtrengthning the brain, and alſo the animal ſpirits; for the taking away the Heterogeneous *Copula*, or for the hindring them from running into exploſions, are to be adminiſtred, which indeed ought to be preſcribed and choſen according to the conſtitution and habit of the Body, and temperament of the ſick; for too lean bodies, and ſuch as being indued with a more hot blood, Medicines leſs hot, and which do not trouble the blood above meaſure, ought to be given: On the contrary, for phlegmatick and fat people, whoſe Urine is thin and watery, and whoſe blood is circulated more heavily, and *Viſcera's* ſtuffed, more hot Remedies, and notably apt to ferment the humors, are deſigned. In the former caſe let it be preſcribed after this manner.

Coroborating medicines and ſpecifick.

Take of the *Conſerve* of the *Flowers of Betony*, *Tamariſk*, the *Male Pæony*, each two Ounces, of the *Species* of *Diamargerit frigida* a Dram and a half, of the *Powder* of the *Root* of *Pæony*, and of the *Seeds* of the ſame, each one Dram, of *red Coral* prepared two Drams, of *Vitriol of Steel* two Scruples, of the *Salt of Wormwood* two Drams, with what will ſuffice of the juice of *Oranges*, make an *Electuary*, take of it twice or thrice in a day, drinking after it a little draught of the Julup hereafter preſcribed.

Powders.

Take of *Coral* red, with the juice of *Oranges*, beaten together in a Glaſs, or Marble mortar, and dried, half an Ounce, of the Powder of *Miſſletoe* of the *Oak*, of the root of the *Male Pæony* two Drams, of perled Sugar three Drams, make a Powder: the Doſe from a Dram to half a Dram, twice or thrice in a day.

Take of the *Species* of *Diamargarit frigida* two Drams, of the *Salt of Wormwood* three Drams, of the root of *Cocoe-pint* powdered one Dram, mix them, make a Powder, let it be divided into xx parts; take a Doſe in the morning, and at four in the afternoon.

Diſtilled waters and Julups.

Take of the *Roots of Butterbur* one Ounce; doſe half a Dram to a Dram twice in a day.

Take of the *Leaves of Burdock* and *Cocoepint* each ſix handfuls, let them be cut and mixed together, and ſo Diſtilled. The Doſe two Drams to three, twice or thrice a day, after a Doſe of *Electuary* or *Powder*.

Take of this water diſtilled two pints, of our *ſteel* prepared two drams, mix them in a Vial, let it be taken after the ſame manner.

Take of the ſimple water of *Walnuts*, and of *black Cherries* each half a pint, of *Snales* three Drams, of the Syrrup of the flowers of the *Male Pæony* two Ounces: the Doſe an Ounce and a half to two, after the ſame manner.

Take of the *ſhavings* of *Ivory* and *Harts-horn*, each three Drams, of the *roots of Chervil*, *Burdock*, *Valerian*, each half an Ounce, of the leaves of *Betony*, *Chamepits*, *Hartstongue*, the tops of *Tamariſk*, each one handful, of the barks of *Tamariſk*, and of the *woody Nightſhade*, each half an Ounce, let them be boiled in two quarts of ſpring water, to the conſumption of the third part; add to it of *white-wine* eight Ounces, ſtrain it into a Pitcher, to which put of the leaves of *Brook-lime*, and *Cardamine*, each one handful, make an infuſion warm, and cloſe for four hours: Let the colature be kept cloſe in Glaſſes. The Doſe ſix Ounces twice in a day; after a Doſe of ſome ſolid Medicine, ſometimes ſuch an *Apozeme* may be mixed with two Drams of our *ſteel*, and taken in the ſame manner.

In the Summer time, the uſe of *Spaw-waters* is convenient; and for want of them, our Artificial ones may be taken.

Remedies in a more cold temperament.

If that for the reaſons above-recited, more hot Medicines are to be preſcribed, you may proceed according to the following method.

Electuaries.

Take of the *Conſerves of Roſemary*, of the *yellow* of *Oranges* and *Lemmons*, each two Ounces, of *Lignum-aloes*, of *yellow-ſanders*, of the roots of *Snake-weed*, *Contrayerva*, *Angelica*, *Cocoepint*, each one Dram, of the *Vitriol of ſteel* (or of *ſteel* prepared) four Scruples, of the *Salt of Wormwood* and *Scurvey-graſs*, each one Dram, with what will ſuffice of *candied Walnuts*, make an Electuary; let it be taken twice in a day, to the quantity of a Nutmeg, drinking after it a doſe of appropriate Liquor.

Take

Take of the *Roots of Male Pæony*, *Angellica*, and red *Coral* prepared, each two drams, of *Sugar* diſſolved in water of *Snales*, boiled to the conſiſtency of Tablets, ſix Ounces, of the *Oil of Amber* lightly rectified half a dram, make a ſufficient quantity of *Lozenges*, each weighing about half a dram, take one or two twice or thrice a day, drinking after it a doſe of proper Liquor. *Tablets.*

Take of the *Roots* of *Virginian Snake-weed*, *Contrayerva*, *Valerian*, each two drams, of red *Coral*, and prepared Pearl, each one dram, of *winteran Bark*, and of the *root of Cretian Dittany*, each one dram, of the *Vitriol of ſteel*, and *Salt of Wormwood*, each one dram and a half, of the extract of *Centaury* two drams, of *Ammoniacum* diſſolved in *Hiſterical* water what will ſuffice, to make a pillulary maſs: of which take four Pills in the Morning, and at four in the Afternoon. *Pills.*

Take of the *Spirits of harts-horn*, or *Sut*, or *humane Blood*, or of *Sal ammoniack*, what will ſuffice, take of them from 10. to 12. drops, morning and evening, in a ſpoonful of Julap, drinking a little draught of the ſame after it. *Spirits.*

Take of the *Leaves of Betony*, *Vervine*, *Sage*, *Lady-ſmocks*, *Cuccoepint*, *Burdock*, each two handfulls, of *green wallnuts*, number 20. the *rinds* of ſix *Oranges*, and of 4 *Lemons*, of *Cardamus*, and *Cubebs*, each one ounce, being cut and bruiſed, pour on them of whey made of *Cider* or *white whine*, ſix pints, let them be diſtilled according to Art. The doſe two ounces or three twice in a day, after a doſe of a ſolid medicine. Add to i. quart of this liquor ii. drams of our *Steel*. *Diſtilled waters.*

Take of the *water of Snails*, and of *earth-worms*, each ſix ounces, *walnuts ſimple* four ounces, of *Radiſh* compound two ounces, of *white ſugar* ii. ounces make a Julap. The doſe 4. or 6. ſpoonfulls, twice in a day, after a doſe of a ſolid medicine.

Take of *millipedes* or *cheſſlogs*, cleanſed, i pint; of *Cloves* cut, half an ounce, put to them i quart of *white-wine*, let them be diſtilled in a glaſs-cucurbit. The doſe one ounce to an ounce and a half, twice in a day.

For poor people, medicines eaſie to be prepared, may be preſcribed after this manner.

Take of the *Conſerves* of the *Leaves of Rue*, made with an equal part of *ſugar*, ſix ounces; take of it the quantity of a *nutmeg*, twice in a day, drinking after it of the decoction of the *Seeds* and *Roots of Burdock*, in *whey* or *poſſet-drink* made of *whitewine*.

Or there may be prepared a Conſerve of the *leaves* of the *Tree of Life*, with an equal part of Sugar: doſe ʒ ß. to ʒ i. twice in a day.

Take of *millipeds* prepared ʒ iii, of *ameos ſeeds* ʒ i. make a powder, divide it into 10. parts, take a doſe twice in a day, or 12 *Sows* or *Woodlice* bruiſed, and whitewine put to them, let the juice be wrung out, make a draught, let it be taken twice a day.

In the mean time, while theſe Medicines are taken inwardly, it is ſometimes convenient to raiſe blifters, with Veſicatories, in the nape of the neck, and behind the ears; for ſo the ſerous and ſharp humors, are very much brought away from the head: beſides ſneezing powders, and ſuch as purge Rheume from the head, often give ſignal help. The taking away of blood from the ſedal veins, or the foot, ought ſometimes to be itterated; yea, and the Diſtemper urging, Plaiſters or Cataplaſms, are profitably applied to the ſoles of the feet. It is alſo beneficial to apply drawing medicines about the calves and thighs.

CHAPTER VI.

Of Convulſive Motions, whoſe cauſe ſubſiſts about the extremities of the Nerves, or within the nervous foldings.

SOmetimes Convulſive Diſtempers do ariſe, without any fault in the Head, by the iritation and exploſion of the ſpirits, remaining about the extremities of the nerves, which plainly appears, becauſe when medicines haul ſharply the Ventricles or Inteſtines, or worms gnaw them, there do not only follow Convulſions in thoſe parts, but beſides convulſive motions do ſometimes torment (or are retorted on) the members, and outward Limbs: for indeed, as we have ſhown elſewhere, when the ſenſe of a very grievons Trouble torments any part, and from that is communicated to the chief ſenſorie, preſently from thence an involuntary and irregular motion, is wont to be reflected on the ſpirits in that place irritated; and that not only by the ſame nerves, to which the ſence of the pain was carried, but ſometimes alſo the Convulſion is reciprocated by others, either neighbouring, or altogether extraneous: So the Stone being fixed in the

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Ureters, and irritating very much its nervous *fibres*, excites convulsive motions, not only in the distempered Vessels, but almost in all the *Viscera* of the Abdomen: So that the Urine being suppressed, Torments diffused here and there, and very often horrid Vomitings follow. Wherefore, 'tis not at all to be doubted, but that both diseases, and some Convulsive Symptoms, are very often induced, by reason of an outward hurt, brought to the Tops of the nerves, terminating within the membranes, muscles, or *Viscera*: yea in the hysterical, *hypochondriaca*, and certain other passions, if at any time Convulsive motions are excited, in the hurt head by the fault of the womb, spleen, or other inward; verily they arise by this only means, to wit, by the Trouble of the rest of the parts, being translated this way through the Nerves, (but in no wise by the Vapours) to the brain, and are propagated all about into various Regions of the Body.

Convulsions begin from the ends of the Nerves, both by reason of irritation.

But it should here be noted, that altho the evident solitary cause, forasmuch as it is strong and vehement, may sometimes induce Convulsions of it self, and without a previous disposition: beacuse indeed the Animal Spirits irritated, beyond measure, begin greater, and more than ordinary explosions, as in overgreat purging, and Vomiting, and the fits of the Collick, and Stone, is ordinarily wont to happen; yet in many other convulsive Distempers, whose fits are often and habitual, besides the irritation made, about the extremities of the nerves, which serves for the most part for the evident cause, also a certain more remote cause is present, to whose efficacy the assault of the disease is chiefly beholden; to wit, when convulsive motions are wont to be excited, and at every turn repeated, by the fault of the Spleen, Womb, or other private part, it may be suspected, that the animal Spirits, of the *Fibres* in the distempered part, and those disposed in its neighbouring parts, had first contracted an heterogeneous, explosive *Copula*, by which being filled, to a running over, they were provoked, by a light occasion, to convulsive explosions: Then, those being first begun, about the extremities of the nerves, creep upwards by the passage of the same nerves, and are often carried to the same nervous origine, and sometimes beyond, to the middle of the brain: from whence, lastly, being reflected on the Nervous stock, they also secondarily cause the convulsions of the members and limbs: But after the brain, and a superior portion of the nervous system, are wont to suffer, and be affected often, by the convulsions below excited, the spirits inhabiting those parts, also begin to be themselves adulterated at length, and to admit an heterogeneous and explosive *Copula*, and so to acquire in part, a procatartick cause; hence at length a Convulsive procatarxis, or more remote cause, becomes common to either end of the Trunk of the same nerves, and the animal spirits of one nerve, or more being evilly disposed, both at the head and tail, conceive explosions from either part, and deliver them presently to the other, as shall be more largely declared below, when we treat particularly of hysterical, and other; passions in the mean time, we will add some histories and observations of convulsions arising from the farther ends or extremities of the nerves.

And by reason of an explosive Copula.

1. *Observation.* A fine maid, about the 16th. year of her age, falling from her horse, and lighting upon a Stone, grievously hurt her left breast, from whence a Tumor arose, with pain, which Symptoms notwithstanding by the use of Medicines, at the beginning seemed to be mitigated, and to be indifferently well, for a long time after. Three years after, she having taken cold, and having observed but a bad course of dyet, all things began to be exasperated, the hurt part swelling into a bigger bulk, troubled her with an acute, and almost continual pain, that the sick Virgin, for the cruel torment, could take no rest for many days and nights, neither could she suffer the *glandula's* of her breast, being then made more tumid, to be either touched or handled; yea nor any noise, or shaking to be made in the Chamber.

When to this Tumour, about to degenerate into a Cancer, they had applied fomentations, and Cataplasms of *hemlock* and *mandraks*, and other stupifying and repercussing things, this gentlewoman began to suffer certain Convulsive affections infesting her very often: At first, as often as the pain in her breast did most cruelly torment her, she felt in that place, prickings, also convulsions, and contractions, running about here and there, then presently her *Ventricle* and *Hypchondria*, and often the whole *Abdmen*, were wont to be inflated, and very much distended, with an endeavour of belching and vomiting; by and by, the same distemper, being leasurely translated to the superior parts, excited Insensibility; to which shortly after, convulsive motions succeeded, in the whole Body, so strongly, that the sick party could scarce be held by three or four strong men.

These kind of fits, at first were wandring, and only occasionally excited: to wit, they would come, as often as the pain of her breast was strained, by some evident cause: Afterwards, these convulsions did more often infest her, and at last, they became habitual, and periodical, twice in a day, to wit, they were wont to come again constantly, at so many set hours after eating: And when after this manner, the sick Gentlewoman had been

been miserably afflicted, for six moneths, at length, she began to be molested with a vertiginous Distemper of her head, exercising her almost continually: for which evil when a fomentation of aromatick and cephalick herbs, had been a good while administred to her head, she became better, as to the giddiness; but then she was perpetually infested with a quite new, and admirable Symptom, *viz.* an empty cough, without spitting, night and day, unless when she was overwhelmed with sleep: After this worthy Virgin, had tryed without much benefit, divers medicines and remedies, prescribed by several Physitians, she was at last helped by making use of the most temperate Bath, at the Bath; then being presently married, after she had conceived, and was brought to bed, she by degrees grew well.

If the reasons of the whole disease, and its accidents, be inquired into, without doubt the convulsive distemper was first of all excited from the tumor or pained place of the breast; the cause of which was partly the most sharp sense of pain, being impressed from its *fibres* and nervous parts, but partly by the heterogeneous Copula, being affixed on the spirits inhabiting those *fibres* and Nerves; for truly, it may be suspected, that the most sharp humour impacted in the Tumor, which perhaps had in some sort flowed thither by the passages of the Nerves, being repercussed by the use of Topicks, had entred the *Fibres* and Nervous filaments, or little strings disposed thorow the whole border or neighbourhood, and so the heterogeneous and explosive Copula, had clove to the spirits; for the shaking off of which, as often as by pain they were excited, they entred into Convulsive explosions, and together with them, other spirits flowing within the neighbouring Nerves, by consent of the forms (as it often happens) were exploded after the same manner: Then the Convulsive Distemper, when it first had begun in the extremities of the Nerves, being continued thorow their passages, even to the head, was wont to cause the insensibleness; and from thence leaping back upon the whole *nervous system*, the Convulsive motions of the Limbs and all the members: The fits, about the beginning of the sickness, being excited after this manner, by reason of pain from the distemper'd part, were carried secondarily to the brain and its appendix: But afterwards, when the spirits inhabiting those places, being often explosed, by sympathy, had so loosned, and weakned the pores of the containing parts, that there lay open a passage within the same, for all Heterogeneous Particles to enter, with the nervous juice, the Convulsive *procatarxis* or more remote cause also increased in the head; and the spirits inhabiting the *Encephalon*, being infected with an heterogeneous Copula, they themselves begun the Convulsive fit, or at least afforded the first instinct to its assault, which did return, for the most part, at such set hours after eating, because the morbific matter was carried in, together with the nervous juice, almost in an equal dimension: In truth, in such cases, where the Convulsion being general, doth possess almost all the parts of the whole *nervous system* successively, we may suspect, that the animal spirits had contracted an heterogeneous and explosive Copula, in the whole nervous stock, which, when it is arisen, at the set time, to a fulness, incites the spirits themselves at the appointed time, in like manner, to explosions, and the same explosion being begun somewhere, is propagated in order to all, after the manner of a fiery enkindling. *The reason of this.*

As to that empty cough, which succeeding the fomentation of the head, exercised this sick person almost incessantly for many months; it seems, that this symptom should depend altogether from the *nervous origine* being distemper'd, and not at all on the stuffing of the Lungs; for she did not avoid any thing with the cough; and if at any time that force of coughing was violently restrained, presently she was troubled with the Sense of choaking in her Throat: So that, as it is very likely, the morbific matter laid up near the *nervous origine* being rarified and stirred, by the fomentation, entred more deeply the heads of the Nerves, appointed for the Lungs, and stirred up in their *fibres* and *filaments*, perpetual convulsions: after the like manner, as when the Nervous juice, which waters the *fibres* and tendons of the Muscles, being made sharp and degenerate, induces to those parts continual leapings and contractions: hence, when a Convulsion or Spasm was stop'd, in some branches of the distempered Nerv s, so as she could not cough, presently the Convulsive motion, running into other branches of the same neighbour Nerve, stirred up that choaking in the Throat. I will here propose another example of a Convulsion, arising from the extremities of the Nerves being affected.

A Noble Matron, of fifty years of Age, after her Courses had left her for about half a year, began to complain, first in a pricking pain of her left Pap; then afterwards, that Distemper leaving her, she was ill about her Ventricle, for there arose an hard, and as it were a schirrous tumour, with a sad pain; upon this came an inflation of the stomach, with difficulty of respiration, a nauseousness, and frequent Vomiting: Then *2. Observation.*

Then the diſeaſe encreaſing, with a more ſharp pain running about here and there, ſhe fell into Convulſive Diſtempers of the Ventricle: to wit, in that place, ſhe was almoſt continually troubled with Convulſions variouſly running about, juſt as if her ventricle had been torn to pieces: Beſides a conſtant perturbation of mind, with thirſt, and watchings, and a frequent *deliquium* of ſpirits, as if ſhe had been juſt dying, exerciſing this ſick Lady: All which ſymptoms, ſhe plainly perceiv'd to ariſe from that Tumour in her ventricle: They ſaw that all vomitory, cathartical, antiſcorbutical, and hyſterical Medicines, did her no good, but were rather hurtful and troubleſome; ſhe received ſome benefit, by the taking away of blood by Leeches, and by the uſe of Aſſes Milk, and afterwards ſhe was much eaſed by the drinking of Spaw waters.

The reaſon of it.

The aforeſaid ſymptoms, which commonly are aſcribed to the hyſterical paſſion, and the vapours from the Womb here plainly appear, to have proceeded from a Tumour, ariſing about the bottom of the Ventricle: for that the blood of this Lady being very hot and melancholick, when it could be no more purged by her Courſes flowing from her, it laid up its recrements, and aduſt fæculencies, at firſt in her Breaſt, and then from a new beginning in the Membranes of her Stomach: From the tumor there made, ſharp and Heterogeneous Particles falling down perpetually, entred the *fibres* and nerves planted round about; which cleaving continually to the ſpirits dwelling in, and flowing into thoſe parts, excited them to frequent exploſions, and ſo made Convulſive diſtempers in all the neighbouring parts: But that ſometimes the Convulſive motions were more light in that place; hence it appears, that the whole nervous ſtock, and the head it ſelf (as is wont to be in greater Convulſions) had not as yet been touched with the ſame diſtemper: But the diſorder of ſpirits ariſing about the parts affected, and from thence transfer'd by a ſmaller undulation or waving to the head, and ſo only lightly diſturbing the ſpirits inhabiting it, induced watchings, with a great heat, and perturbation of the phantaſie. What we have hitherto diſcourſed of Convulſions from the morbific cauſe ſetling upon either end of the nervous ſyſtem, will more clearly appear, when we ſhall hereafter treat particularly of the chief kinds of Convulſions, *viz.* the Hyſterical, hypochondriacal, and other paſſions: In the mean time, there will be no need to add a Curatory method, for this *Hypotheſis* of Convulſions, ariſing by reaſon of the extremities of the Nerves being affected, becauſe the ways of curing may be better accommodated to the Paſſions of this kind, hereafter particularly to be ſpoken of: But for the preſent, it behoves us, to proceed to the unfolding of the Convulſive paſſions, whoſe cauſe, or morbifick matter, ſeems to ſubſiſt within the nervous foldings.

That the nervous foldings is the ſeat of Convulſive matter.

We have largely enough, in another place, diſcourſed of the nervous foldings, and in their deſcription and uſe we have ſhown, that 'tis very likely, the more grievous fits of Convulſive motions, beginning oftentimes within theſe parts, are from thence propagated on every ſide, into the neighbouring parts, and not ſeldom to a great diſtance: at leaſt, that it ſeems much more probable, that the Heterogeneous and exploſive particles, after they have overcome the tract of the head, and its medullary *appendix*, and being more deeply ſlidden into the Channels of the Nerves, and their paſſages, together with the juice watering them, do ſpread their ſtores within the nervous foldings, as it were in Croſs-ſtreets, and by-paths, and there ſometimes make their ſtations, until at length, being more plentifully heaped up, they as it were with collected forces, produce the more cruel Convulſive diſtempers: This I ſay, appears to be much more probable than (what is commonly ſaid) to ſuppoſe them vapours, ariſing from the Womb, Spleen, Ventricle, or any other inward, in which all the fault is eaſily thrown: For within theſe foldings there are ſpaces large enough for morbific mines, that the matter may be there at leaſure laid up, and remain, till it be gathered to a fulneſs: But then, becauſe we believe, that great plenty of ſpirits lodg there, more than in any other little Cells, the heterogeneous *Copula* growing to them, lays as it were tinder for more grievous exploſions, ſo that the ſpirits being exploſed within theſe bodies, do not only inflate, and dilate them, but elevate and lift them up from their place, (even as a houſe blown up with Gun-powder;) wherefore the parts lying over them, are ſuddenly lifted up into a tumor, and looſe, are drawn violently hither and thither. That after this manner, the more cruel fits of Convulſions, about the *Præcordia* and *Viſcera*, are very often ſtirred up, I have found to be true, beſides the Arguments taken from reaſon, not long ſince by my own ſight: For when I opened the dead body of a Gentlewoman who had been exceedingly troubled with (as they ſay) the Mother fits, or hyſterical Diſtempers, I found the Womb wholly faultleſs, but the Nerves near the foldings of the *Meſentery*, (as it ſeem'd) only to be lifted up, and elevated into a bulk, and the Membranes of that inward, appeared torn, and looſned one from another, as being on every ſide tumid and looſe, as it were blown up into little bubbles or bladders.

Indeed

Indeed there are more conſiderations of ſolid reaſons, whereby we are induced to believe, that the paſſions called hyſterical, do moſt often ariſe from the convulſive matter heaped up within the *Meſenterick* enfoldings, and by turns exploſed: which ſhall be more clearly manifeſted, where we treat eſpecially of thoſe diſeaſes. But, neither is it leſs probable, that the Collick-pains, do very often proceed from a more ſharp and irritative matter, contained in the ſame enfoldings. Beſides, as often as the convulſive fits ſeem to begin from the ſpleen or ventricle: by reaſon the beginnings of which are inflations, and very great diſturbances of thoſe parts, it is likely, that the neſt of the convulſive matter, was hid within the nervous enfoldings, belonging to the ſpleen or ventricle: Alſo this kind of matter ſeems to excite within the Cardiac foldings moſt heavy tremblings, and paſſions of the heart; and within the pneumonic or cervical, (or thoſe belonging to the Lungs and Throat) enfoldings, moſt terrible fits of the Aſthma. In our Treatiſe of the Nerves, we have related a notable caſe, of a worthy Gentlewoman, to whom a ſerous matter, wonted to diſtill from the forepart of her head through her left noſtril, fell behind her ear: where when the moſt cruel pain did infeſt her, Convulſions alſo, and admirable contractions followed: whereby the jointing or compaction, now of the brain, and the whole head ſeemed to be pulled downward, now the throat, *præcordia* and *Viſcera* upwards: which kind of Convulſions vexing the parts ſo oppoſite, and at ſuch diſtance by turns, when they did proceed from one and the ſame ſeat of the diſeaſe, planted in the midſt, it will be obvious to conceive, that the grieved place, as the origine of either convulſive affection was the ganglioform enfoldings, planted near the *Parotidæ* or the two chief *Arteries* of the throat: into which the Nerves both of the wandring pair deſcending from the head are entred, and out of which the ſhoots do ſtretch themſelves, into the muſcles of the throat and branches into the *præcordia*, and *viſcera*. Further from the ſame cauſe, to wit, the convulſive matter heaped up, and by turns exploſed, within the ganglioform enfoldings, we think, (and not undeſervedly) that ſenſe of choaking in the Throat, ſo often excited in the convulſive fits, did proceed. But there will be a more fit place, to ſpeak of this, when we ſhall particularly handle the convulſive diſeaſes and ſymptoms. We ſhall now endeavour to ſearch into what remains, of the laſt kind of Convulſions, of which we made mention above, to wit, which relies on the nervous Liquor being infected thorow its whole maſs; with heterogeneous and exploſive particles, and for that reaſon, irritating the whole proceſſes of the Nerves, and the nervous bodies, into univerſal Spaſms, or Convulſions; and thoſe either continual, or intermitting.

CHAPTER VII.

Of Convulſive Motions, ariſing from the Liquor watering the nervous Bodies, and irritating their whole proceſſes into Convulſions.

THat Convulſive diſtempers do ſometimes wander thorow the whole nervous ſtock, and infeſt now theſe parts, now thoſe, now many together, is ſo noted, and obvious almoſt to daily experience, that nothing can be more: we may therefore take notice in theſe, that the tendons of the Muſcles do every where leap up, and are drawn together with ſpaſms; in others, ſome exterior members are bended or ſtretched forth, with various flections, and contortions, here and there, afrer divers manners; we have ſeen ſome forced by the unbridled and untamed force of the ſpirits, as if ſtruck with madneſs to run or leap about, or ſtrongly to ſmite, with their feet, or fiſts, the earth or any objects: which if they ſhould not do, forthwith they would fall into ſwooning fits, and horrid Eclipſe of ſpirits. It would be too tedious, to enumerate all the caſes of univerſal Convulſions, wandring thorow the whole nervous ſtock: But the ſymptoms of this kind, tho they are vorious and manifold, may be reduced nevertheleſs to three chief heads; to wit, foraſmuch as they depend chiefly upon three kinds of cauſes; for indeed in theſe wandring Convulſions we ought to ſuppoſe the whole nervous Liquor to be vitiated, and the animal ſpirits, flowing every where in the ſame to be adulterated, and for that reaſon, to be almoſt perpetually exploded: Take notice then, that this kind of infection is moſt commonly impreſſed on the nervous

Chiefly three kinds of cauſes of univerſal Convulſions.

juice, and the spirits every where flowing in it, by one of these three ways, *viz.* 1st. By Poysons or Witchcraft. 2dly, From malignant or ill-cured fevers, in which the morbific matter is poured forth on the Brain, or nervous stock. Or 3dly, When the nervous Liquor, by a long tract of time, by reason of the scorbutic, or otherwise vitious distemper, doth degenerate from its due constitution into sour, or acid, or any otherwise præternatural and Convulsive Liquor: we will here consider of each of the aforesaid cases, and first of all, of the fits of Convulsion, which are produced by poysons or Sorceries.

From poysons and sorceries.

First therefore, it is somewhere shown by us, that some poysons do act rather on the nervous Liquor, than on the blood, which depraving it most strongly, induce Convulsive distempers: And it appears clearly, from the eating of *Hemlock*, the *laughing Parsly*, *man-drakes*, the furious *nightshade*, *wild Parsnips*, and other hurtful herbs, how soon after horrid Contractions of the *Ventricle*, *numbness*, *delirium*, Convulsions, twitches of the *tendons*, in the whole body, were wont to follow. Besides, those kind of Convulsions follow upon the biting of a mad Dog, and other venomous beasts, where the virulent infection, being received by the nervous juice, and lurking a long while in it, at last puts it self forth, and infects and poysons the whole mass of Liquor, in which it was involved, with its ferment. But what doth yet more illustrate it, are the admirable Symptoms, the truly painful Convulsions, and unweariable dancing, which Authors have related to follow upon the biting of the *Tarantula*; and indeed, might seem fabulous, unless that the truth of the Thing were asserted by many men of good Credit, both ancient and modern: For besides *Mathiolus* and *Epiphanius*, *Ferdinand*, *Gassendus*, and *Kirchir*, add, that themselves were eye-witnesses of this distemper: yea it is said, 'tis a known thing in *Apulia*, and found almost by daily experience, that in that part of the Country, there are *Phalangii*, or a certain kind of Spider, which is called *Tarantula*, from *Tarenta* an ancient City of *Apulia*. This little Animal, being very frequent in the summer, often bites the heedless Countryman, and infects him with its Venomous Stroke, from whence presently succeed a pain in the hurt part, with a Tumor and itching, and by and by in various parts of the body, a numbness, and trembling, also Convulsions, and loosnings of the members, and other Convulsive Symptoms, with a great loss of strength; as may be collected from *Mathiolus*, *Ferdinand*, and others, relating the wonderful effects of this Disease. But truly, what these Authors say concerning the cure of this Distemper, and is practised commonly thorow the whole country, is worthy of great admiration: for these stung with a *Tarantula*, as very sick as they are, as soon as they hear musical Instruments, presently they are eased of their pains, and leaping into the middle of the room they begin to dance, and jump about, and so continue it a long while, as if they were well, and ailed nothing; but if it happen, that the Fiddlers leave off never so little a while, they straitways fall to the ground, and return to their former pains, unless by the incessant musick, they dance, and leap till the poyson be wholly shaken off: For this end therefore, Musitianers are hired, and are changed by turns, that without intermission of the noise, those who are bitten, may dance so long till they are quite cured. Thus saith *Mathiolus*; To which *Ferdinand* adds, that poor people do expend almost all their substance, in these fidlers and musitians, who wander up and down all that Province; and by playing to these *Tarantula sized* people, make much benefit: they dance or leap about in the villages and publick streets, and fields, some one day, some one week, and others more. To these Authors, the most learned men, *Gassendus* and *Kircherus* agree, both of which have related it from their own Observation, that they have known such affected; and they assert, that they are not affected or excited indifferently with any musick, but with certain kinds of Tune, and that they dance to some measures before others.

From poysons of the rank of vegitables.

From a mad Dog.

The reason of the symptoms of those bitten by a Tarantula.

Let us inquire a little further into the reasons of the aforesaid Accidents, if we may follow our conjecture, in this first place, 'tis without doubt, that a certain venomous infection is fixed on the humane body, from the bite of this little creature, which tho it being less infestous to the blood and vital spirit, as soon as ever it passes from it into the nervous Liquor, it presently unfolds it self thorow its whole Mass like leaven, and infects the animal spirits, flowing every where in it; so that indeed, they being drawn one from another, and here and there inordinately moved, induce convulsive distempers, which are accompanied now with the contractures, now with the languishing, and resolutions or loosening of the containing parts.

In what the reason of the Musicks allaying the symptoms consists.

But why the painful Convulsions, which are raised by the bite of the *Tarantula*, being presently allayed by musick, are wont to turn into dancing, does not so plainly appear. That some affirm this little animal (for that by the testimony of *Aristotle* it should be most wise) to be delighted with musick, and for that reason, its venom being

in-

impreſſed on man, by fermenting the humors, to induce the like love of muſick: I ſay, this conjecture will not ſatisfie a mind deſirous of Truth, becauſe, that ſuppoſes a muſick loving nature in the ſpider, and the ſame to be communicated to man, by a *metaſtaſis*, or as it were a certain *metempſycoſis*, or tranſmigration of ſoul, both which are taken upon truſt, and little ſatisfactory; but it may be rather ſaid, that the venom inflicted on the nervous liquor, by the bite of the *Tarantula*, is too gentle to be able to extinguiſh wholly the Animal ſpirits, or to diſſipate them very much aſunder, and to compel them into more cruel exploſions, but only to put them to flight, and to incite thoſe flying here and there, into lighter, and ſomewhat painful Convulſions; and that the Muſick with its flattering ſweetneſs, doth congregate together, aud mutually aſſociate with eaſe the ſpirits ſo diſſipated; wherefore, whenas the ſame ſpirits, by reaſon of the Infection ſticking to them, are apt to involuntary and Convulſive motions, the melody diſpoſes them, delighted together, and directs them to ſuch Convulſions, that entring the bodies of the nerves, by a certain Courſe and Order, they are carried as it were in certain preſcribed limits and compaſſes, until at length the particles of the venom, being quite evaporated, and the fury and rage of the ſpirits being worn out, they wholly ſhake off that madneſs. For truly, muſick doth eaſily carry men ſound and ſober, whether they will or no, or thinking of another thing, into actions anſwerable to the ſound of the harmony; that preſently the ſtanders by, at the firſt ſtriking up of the fiddle, begin to move their hands and feet, and can ſcarce, nay are not able to contain themſelves from dancing: Let none therefore wonder, that in men bitten by the *Tarantula*, when the animal ſpirits being moved, as it were with goads, they are compelled to leap forth, and wander about hither and thither willingly, if they are excited to dancing and compoſed meaſures, at the ſtroke of an harp, ſo that as in theſe diſtempers, the ſpirit of the muſick, as it were inchanting the outragious ſpirits, and in ſome meaſure governing, and changing their convulſive motions, ſerves inſtead of an Antidote: for that the animal ſpirits, being very much, and for a long while exerciſed, after this manner, wholly ſhake off the Elaſtic *Copula*, contracted by the poyſon, or otherwiſe; and they being very much wearied, at length reſt from that madneſs, or its incitation.

A deſcription of the dance of St. Vitus.

That which is called the *Dance of* St. *Vitus*, is an evil akin to this, concerning which *George Horſtius* relates, that he had ſpoken with ſome women, who for ſome years, viſiting the ſhrine of St. *Vitus*, which is in the borders of *Ulme*, did there exerciſe themſelves even night and day, with dancing and diſcompoſure of mind, till they fell down like people intranced: by which means they ſeemed to be reſtored to themſelves, that they felt little or nothing for a whole year, till about the time of *May* following, when by the inquietude of their members, they ſaid, they were ſo far tormented, that they were forced to go for their health ſake yearly to the aforeſaid place, about the feaſt of St. *Vitus*. *Horſt. Epiſ. Med. Sect. 7. de admirandis Convulſionibus.*

The reaſon of it.

Indeed it is a uſual thing (as I have obſerved) both for men and women, to be ſometimes tormented with this inquietude of their members, and as it were with a fury or madneſs, that they have been forced to walk, till they were tired, as alſo to dance, leap, and run about, here and there, that by this means they might ſhun the grievous trouble, and ſometimes faintings away, which were about to invade them: The reaſon of which ſeems to be, that the animal ſpirits, foraſmuch as they being incited by an heterogeneous *Copulr*, in the whole nervous kind, become fierce, and altogether unbridled, which to exerciſe and tire out, there is need, both that they themſelves may be tamed, and that the exploſive *Copula* may be ſhaken off.

Univerſal Convulſions from Witchcraft.

That Convulſive diſtempers are ſometimes excited by witchcraft, is both commonly believed and uſually affirmed by many Authors worthy of Credit: and indeed, as we do grant, that very oftentimes moſt admirable paſſions ate produced in the humane body by the deluſions of the Devil, forasmuch as he, to cauſe wonders, by which he might rule, by the ſubtlety of working, inſinuates to the ſenſitive ſoul, or the conſtitution of the animal ſpirits, heterogeneous Atoms or little Bodies, and ſo adds now ſpurs or pricking forward, and now caſts chains on its functions, and now carries them to miſchief: alſo by ſome means he enters himſelf into the humane body, and as it were another more mighty ſoul, is ſtretched thorow it, actuates all the parts and members, inſpires them with an unwonted force, and governs them at his pleaſure; and incites to the perpetrating of moſt cruel and ſupernarural wickedneſſes: yet all kind of convulſions, which beſides the common manner of this diſeaſe, appear prodigious, ought not preſently to be attributed to the inchantments of Witches, nor is the Devil preſently or always to be brought upon the ſtage. For indeed as often as a child, or relation of ſome man of the richer ſort is by chance taken with moſt cruel and unuſual Convulſions, for the moſt part it falls out, that by and by the next old Woman

Which are commonly but calſly ſo thought.

is accuſed of Witchcraft, ſhe is made guilty, and very hardly, or not at all, the wretch eſcapes the flames, or an halter; when in the mean time, the Diſeaſe proceeding from cauſes meerly natural, may be eaſily cured, by no other Exorciſm, than Remedies uſually preſcribed againſt Convulſive Diſeaſes: In truth, the animal ſpirits being indued with a more cruel exploſive *Copula*, and being ſtrucken by it all of a heap together, obtain ſo much ſtrength and vigour, beyond their proper and wonted power, as the flame of Gun-powder has above the burning of the common flame; ſo that thoſe who obnoxious to this Diſeaſe, out of the fit may be govern'd, lifted up, and moved at pleaſure, with the light help of one man; when the ſame is upon them, make nothing of the utmoſt endeavours and force of at leaſt four of the ſtrongeſt men: But if in the caſe of any one that is ſick, there ariſe a ſuſpition of Witchcraft, or Faſcination, there are chiefly two kinds of motions that are wont to create and cheriſh this opinion, *viz.* 1. If the Patient doth perform the contortions or geſticulations of his members, or of his whole body, after that manner, which no ſound man, nor mimick, or any tumbler can imitate. Then, Secondly, If ſuch ſtrength be ſhown, that ſurpaſſes all human force; to which, if the avoiding of monſtrous things happen, as when bundles, as *Henry van Heers* relates, are caſt forth by Vomit; or a live Eel, as *Cornelius Gamma* tells, voided by Stool, without doubt it may be believed that the Devil has, and doth perform his parts in this Tragedy.

The reaſon of them.

Which argue witchcraft.

It were eaſie to heap together very many, and indeed admirable Hiſtories of perſons of every Age and Sex, affected after a ſtupendious, and as it were ſupernatural manner, with the manifeſt ſuſpition of Witchcraft: for ſuch are every where extant among Authors, both Phyſicians, and Philoſophers; and becauſe vulgar rumor noiſes about Diſeaſes cauſed by Witchcraft, to happen often in almoſt every Country: but becauſe theſe kind of caſes are full of Impoſture, or always increaſed by the fictious lies of the relators, to create admiration (and for that they rarely fall under the medical cure) I will here purpoſely omit them: what remains is, That I proceed to unfold the next kind of univerſal Convulſions, to wit, which comes upon malignant, or otherwiſe irregular or ill-cured Fevers.

CHAPTER VIII.

Of Univerſal Convulſions, which are wont to be excited in Malignant, ill-cured, and ſome irregular Fevers.

Univerſal Convulſions hapning in Fevers.

THat Convulſions ſometimes happen to perſons ſick of Fevers, almoſt every ordinary body underſtands, and from thence takes a remarkable Prognoſtication of death, or peril: For in malignant Fevers, alſo ſometimes in the ordinary ill-handled, as the *Virtego*, or *Delirium*, ariſe from the morbific matter being laid up in the Brain, from the Blood; ſo from the ſame, being ſlidden down into the Nervous ſtock, contractures and twitches of the Muſcles and Tendons; alſo ſudden ſhakings of the Members and Limbs; and ſometimes moſt horrid ſtifneſſes in the whole Body ſucceed: The reaſon of which kind of ſymptoms ſeems to conſiſt in this, that the Liquor watering the Nervous parts, abounds every where with heterogeneous Particles irritating the ſpirits: for by that means the ſpirits inhabiting and influencing, being diſturbed in their juſt influence and emanation, are incited into continual exploſions, as it were a crackling noiſe, not much unlike, as when the flame of a Lamp being imbued with droſſy and ſalted Oil, aſcends with a noiſe and ſparkling: which kind of Convulſive Diſtempers, for the moſt part, happen about the height of Fevers, when the morbific matter being firſt laid up in the blood, is from thence transfer'd to the brain; and that being paſs'd thorow, and alſo infected, it is carried into the ſyſtem of the Nerves, and from thence ſtirs up Convulſive paſſions, with or without a *Delirium*.

The reaſon of the ſymptoms.

But indeed, it is ſometimes obſerv'd, That beſides theſe kind of Convulſive Diſtempers, coming upon Fevers, and ſecondarily excited; in a malignant conſtitution of the Air, alſo from the Breath of a Peſtilent Contagion, the Nervous Liquor hath been infected before the blood, or elſe apart from it; and therefore a *Delirium*, or Convulſions, have gone before a Feveriſh Diſtemper. Further, I have often obſerved, That ſome irregular Fevers have aroſe, in which the blood has been hardly ſeen to boil up, or grow hot above meaſure, but the beginnings of this flow and very dangerous

gerous Fever, were laid chiefly in the nervous humour; which being by degrees brought to maturity, did induce Convulsive Distempers, with a *Delirium*, or madness, and other wastings or exorbitances of the Animal Spirits. For the sick never complained of heat, or thirst, being soon made feeble, and as it were strengthless, they were presently obnoxious to frequent giddiness, also to tremblings of the Limbs, and as it were leapings forth; besides, to twitches or jumpings of the Muscles and Tendons, and to contractures, and pains wandring about, here and there. This kind of sickness, by some Physicians, because it seem'd to consist in the solid parts, rather than in the blood, is called a *malignant hectick Fever*; when indeed, the same being fixed chiefly in the nervous humour, may be better called, the *Convulsive nervous Pestilence*.

A description of a convulsive disease of Hassia, *sometimes epidemical.*

There is mention made by *Gregory Horstius*, of a *Convulsive* and *malignant Disease*, which was sometime past *Epidemical*, in *Hassia*, *Westphalia*, and the neighbouring Countries: they being taken therewith, without a Feverish heat, immoderate effervescency of blood, whilst they were imployed about their familiar occasions, hardly perceiving themselves to be sick, were wont to have about their hands or feet, and sometimes in both, a sense of tingling, with a numness running up and down: then, by and by, their fingers, together with their Arms and Thighs, were now strictly drawn together, now most strongly stretched forth, as if they were frozen. Those kind of contractions, and extentions, rendred themselves by turns, and then changed places, that now the distemper resided in one part, then presently in another: But (as it often hapned) if the Disease at once invaded the whole Brain, universal Convulsions, and oftentimes epileptical fits, infested the sick: besides, those labouring with it, were obnoxious at some turns to a *Delirium*, *Madness*, and sometimes a *Lethargie*: This sickness continued a long time, without any *Crisis*, or sound solution, and could scarcely be so perfectly cured, but that the disposition of the Brain, and nervous parts remained evil all their life after.

The reason of the symptoms.

As to the reasons of this Disease, and symptoms, it is obvious enough, that the same depends altogether upon the vice, and notable depravation of the nervous juice. That pricking, or tingling, for the most part, at the first coming of the disease, was procured for this reason, because that Liquor, beginning to be poysoned, and loosned in its mixtion, by the malignant infection, presently it oppressed the animal spirits, abounding therein, and inhibited them from their wonted and free expansion; wherefore, they being half overwhelmed, and constrained to creep, as it were, among Briers, or things that catch'd hold of them, or held them back, they excited the sense, as it were of tinglings, running about: but then, because this Disease growing worse, the nervous Liquor was yet more perverted in its *Crisis* or disposition; the Heterogeneous Particles, which were brought together in it, cleaving to the spirits, caused them to be moved hither and thither, and to be unduly exploded; for which reason, the contractions and horrid distentions in the members, and the tumults and great inordinations in the head, were raised up. But that in this Fever of the Nerves a solution or difficult *Crisis*, or none at all hapned, the reason was, because the nervous juice being slow, and as it were mucilaginous, and therefore heavy in its motion, was not defæcated or cleared, as the blood, by a critical effervescency, nor easily conceived, that kind of fermentation by which the pure might be separated from the impure.

Indeed I have known a sickness, much like to this example, to be often excited in our Country, and to invade whole Families, especially Children, and the younger People. Some years since, a popular or childish Fever, very much infesting the Brain and Nervous stock, exceedingly spread in this Country, yea almost thorow all *England*: The History of which Disease, being described in that time, in which it raged, *viz.* in the year 1661. I think it worth our pains to insert, in this place of our Convulsive *Pathology*: For from hence, it may appear, by what means, and from what causes, the Convulsive symptoms, which come upon any Fevers, are wont to be excited.

A Description of an Epidemical Fever chiefly infestous to the Brain and Nervous stock, spreading in the year 1661.

The History of an Epidemical Fever raging in the year 1661.

IN this Country, before the last Summer, *viz.* 1661. we had been free for above two years, from any popular Disease, unless such only as usually come in some places; but then, before the Summer Solstice, the *small-Pox* (a distemper here rarely Epidemical) being rife in many places, raged very much: After that Summer, which was extreamly hot and dry, an Autumn moister than usual followed: and after which, a most mild Winter, almost without any cold: in all which space, the Earth was hardly covered with Snow, or was ever hard frozen, above three or four days; so that within a few weeks, after the Winter Solstice, the Trees began to bud, and the vernal Plants to break forth from the bosom of the Earth, and to flower, and also the birds to build nests: to this mild season, not eventilated at the beginning of the spring, by the nitrous little bodies that were wont to be blown from the North, a filthiness of showers, and almost continual wet succeeded. After the vernal *æquinox*, a certain irregular, and unaccustomed Fever, seised upon some, here and there, which within a month became so Epidemical, that in many places it began to be called the *New Disease*; Raging chiefly among Children, and Youths; it was wont to afflict them with a long, and as it were a chronical sickness: yea sometimes, old men, and men of middle Age, though rarely, were seised by it, and those indeed, it did sooner, and more certainly kill. The Distemper at first invading any one, did creep on them so silently, that the beginnings of the sickness were scarce perceived: for arising without immoderate heat, or more sharp thirst, it induced in the whole body a great debility, with a languishing of the spirits, and a torpitude or numbness of the function; The Stomack was ready to loath any victuals, and to be grieved at any thing put into it, and yet not easie to vomit. The sick were unfit for any motion, and only lov'd to be idle, or to lie down upon the Bed: within a short time, also sometime at the first coming of the Disease, they complained of a heavy *vertigo*, a tingling of the ears, and often of a great tumult and perturbation of the brain. Which kind of symptoms were often esteemed, as it were the peculiar sign of the approach of this Disease, if in some those had been wanting, or hapned to be more remiss, instead of the head being affected after that manner, the Disease took more deep root in the Breast, with an excited Cough, as shall be told by and by. But whilst the Brain, and the Nervous *Appendix*, being after this manner affected, the animal spirits, presently from the beginning of the sickness, were benummed, a slow, and as it were Hectick Fever, was inkindled throughout: but yet the effervescency of the blood, which was hardly continual, but flitting and uncertain, was according to the disposition of the blood it self, in some more intense, in others more remiss; and therefore, thirst, the white scurf of the Tongue, and other symptoms, which accompany a feverish distemper, did more or less infest them: sweating did not willingly follow; nor could it easily, or by a light thing be caused by Art: yea, neither this, nor any other evacuation, as it were critical, at any time succeeding, did suddenly help this Disease; but it persisting for many weeks, and sometimes months, reduced the sick to the highest *Atrophie*, or wasting of all parts, and often infected them with an incurable Consumption.

Its procatartick or more remote cause.

The Symptoms.

About the increase of the Disease, which hapned in most within eight days, if the Distemper (as it was often wont) did settle chiefly in the head, and nervous system, most grievous symptoms, in their Dominions, *viz.* a plain Phrensie, or deep Stupidity, or Insensibility did molest them. For I often observed, in many Children, and not seldom in Women, after seven or eight days from their falling sick, that their knowledg and Speech failed them, and so the sick have lain, for a long while, yea, sometimes for the space of a whole month, without any taking notice of the by-standers, and with an involuntary flux of their excrements; but if they continued in some sort the use of Judgment and Reason, they laboured with a frequent *Delirium*, and constantly with absurd and incongruous *Chymera's* in their sleep. But in men, and others of a hotter temperament, from the morbific matter, instead of a *Crisis* being transfated to the brain, a fury, or dangerous, and oftentimes deadly Phrensie did succeed. But if neither stupidity, nor great distraction did fall upon them, swimmings in the head, Convulsive motions, with Convulsions of the members, leapings up of the *tendons*, did grievously infest them. In almost all the sick, the belly was for the most part loose, casting forth plentifully now yellow, now thin and serous excrement, with a great stink; it was rarely that vomiting fell upon any one: The urine in the whole process of the Disease,

Diſeaſe, (unleſs when the morbifie matter being carried more plentifully into the Brain, did threaten a Phrenſie) was highly red, ſo that ſome, by reaſon of the deep colour of the water, judg'd this Fever to have been plainly Scorbutick: which notwithſtanding appeared to be otherwiſe, becauſe *antiſcorbutic* Remedies, (of which indeed many, and almoſt of every kind were tried) were little or nothing beneficial. It was moſt of all to be admired, how ſoon after the beginning of this Diſeaſe, the fleſh of the ſick conſumed, and they reduced to the leanneſs of a *Sceleton*, when in the mean time there was no great heat that might by degrees conſume the ſolid parts, nor any violent evacuation, which might greatly take them down.

Beſides theſe evils moleſting the region of the head, a diſtemper no leſs dangerous oftentimes fell upon the breaſt. For in ſome, tho not in all, a Cough very troubleſome, with abundance of ſpittle, and thick, was excited: this hapned in ſome about the declination of the Diſeaſe, to wit, whilſt the confines of the brain were ſerene, as it were the clouds ſent from thence to the Thorax, a great *Catarrh* ſuddenly rained down upon the Lungs. But in others, who eſpecially had little infection of the Diſeaſe in the head, preſently after the beginning of the Fever, a cruel Cough, and a ſtinking ſpitting, with a conſumptive diſpoſition, grew upon them, and ſuddenly, and unthought of, precipitated the ſick into a *Pthiſis:* from which, nevertheleſs, they recovered, by the timely uſe of Remedies, often beyond hope. It was obſerv'd in ſome, That after a long eclipſe of the ſenſitive facultie, and oppreſſion of the brain, from the morbifie matter, at length tumors did follow, in the glandula's, near the hinder part of the neck, out of which, being hardly ripened and broke, a thin and ſtinking ichor or matter ran for a long time, and brought help. I have alſo ſeen watery puſtles excited in other parts of the body, which paſs'd into hollow ulcers, and hardly curable: ſometimes little ſpots, and *petechiales*, appeared here and there: yet I never heard that any more broad or blew, of theſe kind, were ſeen in the ſick. Notwithſtanding, tho this Fever was not remarkable for very many malignant ſpots, yet it was not free from Contagion. For that in the ſame Family, it invaded almoſt all the Children and Youths ſucceſſively, yea not rarely thoſe of more ripe years, and at mens eſtate, who looking to the ſick, were familiarly converſant in their Chambers, or about their beds, were infected with the ſame infection: But indeed, there was not ſo much cauſe of ſuſpition, that for it the friends of the ſick ſhould be wholly interdicted from commerce with, or viſiting of them.

Altho the courſe of this Diſeaſe (unleſs when it intimately ſetled in the brain) did appear ſo gentle, and continued without any horrid ſymptom; yet its cure being always difficult, ſucceeded not under a long time: For the ſick rarely grew well within three or four weeks, yea for the moſt part ſcarce in ſo many months. If this Diſeaſe fell upon men of a broken Age, or ſtrength, eſpecially thoſe who were before obnoxious to *cephalic* diſtempers, as the *Lethargie*, *Appoplexie*, or Convulſion, it oftentimes kill'd them in a ſhort ſpace: but if there was any hope of recovering, it could be but ſlowly procured, (all Remedies whatſoever ſcarce bringing any ſenſible help) ſo that the ſick did no ſooner come out of the ſphere of this Diſeaſe, than they fell into the confines of a Conſumption.

If the formal reaſon, and courſes of this aforeſaid ſickneſs be demanded, it here eaſily appears, the watering liquor of the brain and nervous ſtock, for the moſt part both together, with the blood, to be in fault; and the immediate cauſe, eſpecially of the troubleſome ſymptoms, to wit, foraſmuch as this water, preſently after the firſt aſſault of the Diſeaſe, was grown more poor than uſual, and as it were lifeleſs; therefore a languiſhing, and enervation, with a *ſpontaneous* wearineſs and impotency to motion, hapned in the whole body, and with a ſudden waſting of the body in the ſick. Further, foraſmuch as the ſame Liquor was ſtuffed with heterogeneous Particles, *viz.* partly narcotick, partly exploſive; therefore a numbneſs, a ſenſe of pricking, leapings up of the tendons and muſcles, and contractures, alſo the *Virtego*, giddineſs, and other more grievous Cephalick diſtempers did ariſe. Moreover, foraſmuch as by reaſon of the evil of the nervous juice, being not quickly or hardly to be mended, the cure or healing of the Diſeaſe became ſo hard and lingring. But for that the fault of this *Latex*, neceſſarily depended on the diſcraſie or evil diſpoſition of the blood, alſo of the depraved conſtitution of the brain, what their morbid diſpoſitions were, and by what means they brought forth the beginning or tinder of the ſymptom of the Fever but now deſcribed, let us now ſee. *The reaſon of them.*

As to the former, it ſeems, that at this ſeaſon, by reaſon of the hot and humi'd conſtitution of the year, and no blaſt from the north (the little bodies of which imbue the blood and juices of our body, as it were with a nitrous ſeaſoning, and by agitating them, defend them againſt putrefaction) the blood in moſt men, and chiefly in Children,

dren, Youths, and Women, became like ſtanding-water, that ſo contracts a ſetling very impure, ſtuft with heterogeneous particles, and turning to a clammineſs, and watriſhneſs; in which, the more pure ſpirit and ſulphur, being ſomewhat depreſs'd, the watery particles, being carried forth with the impure ſalt and ſulphur, were too much exalted. Wherefore the blood, both by reaſon of its *Criſis* or conſtitution being vitiated; alſo by reaſon of heterogeneous particles being heaped up more plentifully in its boſom, was made more fit, either of its own accord, or occaſionally, or becauſe of the contagion to receive a feveriſh Effervescency, ſo that from thence, very many fell at this time into fevers. But the blood growing hot, from the feveriſh taint being received, did not preſently burn with an open flame, but like green wood laid on the fire, with a flame as it were ſuppreſſed, and much incumbred with ſmoke. Wherefore, the morbific matter, being heaped within its maſs, was not wont (as in a regular fever) to be conſumed by the burning, and its reliques at the ſet time to be exterminated by the *Criſis*: but yet, a little after the beginning of the feaver, a great portion of this matter being poured into the head or *Thorax*, or into both at once, and afterwards being continually ſupplied in thoſe parts, it induced either the aforeſaid diſtempers of the brain and nervous ſtock, or cough with a conſumptive diſpoſition, or both together; and for this reaſon, about the beginning of this diſeaſe, when a pulſe quicker than it ought to be, and a high coloured urine, and full of contents, did ſhow the blood to grow hot with a Feveriſh diſtemper, the ſick did not complain of heat, or thirſt, becauſe the blood growing hot, did lay up its impurities and recrements, forthwith into the proviſion of the nervous Liquor, or into the Lungs; wherefore, within theſe receptacles, the Symptoms preſently became worſe; but afterwards the diſeaſe growing on, a ſomewhat ſharp heat, with ſcurfneſs of the tongue, was wont to be troubleſome to ſome: yea, in all, a ſlow, and as it were hectick fever, continued throughout; which neither by ſweat, nor by inſenſible tranſpiration, could be ſo wholly removed, but that it was daily renewed, chiefly after eating, tho never ſo ſmall: which thing truly ſeemed to happen, becauſe the nervous juice being full of the feculencies brought from the blood, did not afterwards receive them in ſo great plenty, but that theſe recrements, together with the nutricious humor, (and for that this was not conſumed by nouriſhing the ſolid particles) remaining within the bloody maſs, cauſed it then to grow feveriſhly hot.

2ly, Beſides this morbid diſpoſition of the blood, contracted from the intemperance of the year, it ſeems, that the brain alſo, from the ſame occaſion, was made prone to the aforeſaid paſſions. For when for a long tract of time, the ſouthern winds did continually blow with a moiſt conſtitution of the air; from thence the paſſages and pores of the brain, being very much looſned and opened, and its connexion too much diſſolved, they gave an eaſie paſſage to ſerous humors, and for all ſorts of heterogeneous particles; wherefore the blood being very feculent and watery, as ſoon as it began to grow hot from the fever, carried its ſerous recrements and filths, preſently thorow the two open doors into the head: for whoſoever he was, who did not complain of his head, being too much ſtuffed with a moiſt air, and numbneſs of ſpirits; on the contrary, his pores being bound together by an intenſe cold, or drier air, all his ſenſes and faculties remained more quick and lively.

Theſe things being thus premiſed, concerning the morbid proviſion of the brain and humors, to wit, of the blood and nervous humor by reaſon of the conſtitution of the year, whereby indeed, very many at that time, fell into a ſlow, uneqnal, and long continuing fever, ſurrounded with *Cephalic* and *Convulſive* ſymptoms, and hardly curable: hence alſo it will be eaſie to unfold the reaſons of the reſt of the ſymptoms and accidents, chiefly to be noted in this diſeaſe.

Why this diſeaſe chiefly invaded children, women, and phlegmatick men.

For firſt of all, that this irregular Fever raged chiefly among Children, young Men, Women, and phlegmatick men, the reaſon was, becauſe in thoſe kind of bodies, the blood was apt to be more wateriſh, and leſs perſpicable, and from thence to gather a ſerous *Colluvies*, or watry humor and heterogeneous feculencies; and alſo, the brain being more humid and weak, eaſily received any recrements of the blood. Wherefore it may be obſerved, that thoſe ſort of perſons, were found more prone to Convulſions, ariſing by reaſon of any other occaſions.

The reaſon of the Atrophie coming upon the fever.

Secondly, the noted *Atrophie* or leaneſs, came ſo ſuddenly upon this fever, becauſe by reaſon of the depravation of the nervous juice, the officies of nouriſhment, depending upon it (which as we have elſewhere ſhown, are highly active) preſently failed. For altho we do not grant, the nervous humor to be only nutricious, but to diſpenſe thorow the Arteries, a matter deſtinated to the nouriſhable parts, prepared in the bloody maſs; yet it may be lawful to think, that the Liquor watering the brain and nervous ſtock, by means of an efficient cauſe, doth conduce very much to alimentation; for this growing

ing turgid with animal ſpirit, actuates and invigorates the nutricious juice, brought to every part by the blood, and admitting it into the paſſages, and moſt intimate receptacles of the body to be nouriſhed, and as it were leading it in, aſſimilates or reſembles it; wherefore, when this houſhold liquor is ſo depraved, that it doth not rightly ſupply the animal ſpirits, requiſite about the work of nutrition, all the members and parts of the ſtomach vitiated in its tone, either ſpues back whatſoever nouriſhment is brought, or cannot receive it to its proper uſe: wherefore truly in this Diſeaſe, the bulk or habit of the body, however fuller or fatter, was more ſooner pulled down, than in a continual Fever, where it might much more evaporate by the intenſe heat, or copious ſweats. The reaſon of which is, becauſe in a burning Fever, altho the blood grow n; very hot, exhales more plentifully; yet in the mean time, it continually affords ſomething of nouriſhment, which the ſeveral parts helped by the benefit of the nervous juice, eaſily received and aſſimulated; but in this nervous Peſtilence, altho the nutritive matter was ſufficiently provided, yet by the defect of the nouriſhment of the ſpirits, the nouriſhment was altogether inhibited.

Why this Fever was hardly curable.

3. For the aforeſaid reaſons alſo, this Fever being a long while protracted, was wont ſcarce ever to be critically helped, and difficultly cured, by the help of almoſt any Medicines: For the feveriſh matter creeping preſently from the beginning of the Diſeaſe into the nervous liquor, could hardly afterwards, and not but of a long time, be exterminated from its boſome: for that this water, with a ſlow motion, and flowing leaſurely in the ſtraight veſſels, does not as the blood, conceive of its own accord a purifying efferveſcency or fermentation; neither can the forces of Medicines reach to it ſo eaſily and unmixed: but either they are firſt hindred by other parts, or becauſe they are heterogeneous, they are wholly excluded from the brain, caſting back whatever is incongruous. In truth for this reaſon, all diſtempers of the brain and nerves, as it were making a mock at Medicines, are moſt difficultly cured. Therefore in this Fever, if the evil impreſſed on the brain and nervous ſtock was taken away, either a cruel cough with plentiful ſpitting, or tumors, or an impoſthume in the neck did follow: to wit, the morbific matter being ſupped back by the blood, and again depoſited, ſetled either in the *Thorax*, or in the Glandula's and Emunctories, nigh the hinder part of the neck. But this Diſeaſe was the more contumacious, becauſe the diſcraſie or evil conſtitution of the blood, was not eaſily mended: for altho from the beginning, its *Latex*, the recrements being poured forth, even into the nervous Liquor, grew but little and ſluggiſhly hot; yet afterwards, theſe receptacles being filled, and the morbific feculencies, and beſides the nutritious matter, not imployed in nouriſhing the parts, being reſident even in the blood, did aggravate it, and for the excluſion of this trouble, not to be immixed with it, did induce an efferveſcency, ſuch as is wont to be in an hectict Fever, either almoſt continual, or preſently apt to come again. For I have often obſerved in this Fever, from Grewel, Barley-broth, and other ſlender diet, no leſs ebullition of the blood to be ſtirred up, than from broth made of fleſh: whether indeed the nouriſhing juice ſupplying the blood from the chyle, becauſe it was not imployed in the work of nutrition, carried ſomething heterogeneous, and not rightly miſcible, as a trouble to the blood; and by reaſon of the particles of this ſuperfluous juice, being copiouſly ſent away with the *ſerum*, the Urine became very thick, red, and very full of contents: Alſo, for the ſame reaſon, the belly was for the moſt part looſe, foraſmuch as the blood, filled full of the nutritious juice, did ſuck forth a leſſer portion of the chile from the bowels, and did pour back again part of that which had been brought to it on the inteſtines; the feveriſh Diſtemper did likewiſe ſtick ſo long in the blood, becauſe, till the animal regiment being reſtored, nutrition was rightly performed, that ſuperfluous matter was carried into the maſs of blood.

We deliver the example, and the *Ætiology*, or rational account of this aforeſaid Fever, more largely for this reaſon, becauſe the ſame Diſeaſe did fall upon our Country-men, here and there alſo at other times: for that of late, in this City, all the younger people of a certain Family, were ſick of it: yea, I remember, that ſome time paſt, very many laboured with ſuch a Fever. Out of the many Hiſtories and Examples of ſick people, which it rendred when it was epidemical, I will here propoſe one or two.

1. *Obſervation.*

A ſtrong and lively young man, about the beginning of the ſpring, 1661, falling ſick, without any evident cauſe, without any great heat or thirſt, he became ſuddenly weak, and as if enervated, with a dejected appetite, and languor of ſpirits. *Cathartick Remedies*, *Antipyretics* or allaying of heat, digeſtives, and alſo antiſcorbutics, and others of various kinds, adminiſtred by the preſcriptions of the moſt famous Phyſicians, availed nothing: But, notwithſtanding, the ſick man hitherto languiſhing with a

ſlow and wandring fever, with a quick and feeble pulſe, a deep-coloured urine, had kept his bed a fortnight; beſides being reduced to the greateſt leanneſs, he complained of a giddineſs, and as it were the fluctuation of a ſound in his head, and a tingling noiſe in his ears. Altho he was troubled with a great ſtupor, yet his ſleeps were mightily troubled with delirious fables. After four days, when the fever was not yet declined, it was thought good to take away four or five ounces of blood by Leeches, from the ſedal veins; from hence the fever began to be much exaſperated, for a great intenſe heat, with thirſt, watchings, and almoſt continual toſſing of the body, alſo the tongue dry, and ſcurfy, appeared; then quickly a troubleſome cough, with abundance of diſcoloured ſpittle followed; to him were adminiſtred, *almond*, and *barly-drinks*, with temperate bechicks (or things to ſtop coughing) boiled in them: water of milk diſtilled with ſnails, and pectoral herbs, the ſhelly powders, prepared nitre, and often Cordial Opiats; which notwithſtanding ſcarce giving any help, the ſick man ſtill became more weak; when in this manner being ſick above two months ſpace, the feveriſh diſtemperature, and cough alſo, daily growing worſe, he ſeemed near death, at length a voluntary ſweating ariſing, ſo that every night, or every other night, he ſweat abundantly, and from thence finding himſelf better, uſing then the foreſaid Remedies, he grew well within ſix weeks.

The reaſon of it.

Till I had ſeen many ſick people after the ſame manner, I ſuſpected this diſeaſe to be altogether an hectick fever with a conſumptive diſpoſition of the Lungs; but when I ſaw many others at that time fall ſick ordinarily, after the like manner, I eaſily inſtituted the *Ætiologie* or national account of this feavour, ſuch as I have already deſcribed: to wit, that the blood, becauſe of the intemperature of the year, and perhaps from errors in diet, had contracted a vitious *procatarxis* or remote cauſe: Then it growing feveriſhly hot, and preſently carrying its impurities to the brain, and ſo depraving the juice, watering it, and the nervous ſtock, induced the vertigineous diſtempers, with a *ſtupor*, a languiſhing of ſpirits, and an *atrophy* of the whole body: but ſo long as the blood did transfer its recrements, from its own boſom, into the brain and nervous *appendix*, the feveriſh heat continued more gentle and mild; but afterwards, when the tending downwards of the morbific matter, by the opening of the hemorhoid veins, was drawn away from the brain, the ſame being firſt retained within the bloody maſs, increaſed the fever; then being poured on the Lungs, excited the cruel cough, with plentiful ſpittle: but foraſmuch as the fleſh of the Lungs remained free from putrefaction, as ſoon as the ſerous water was ſent away by a more plentiful ſweating, the ſick man became free, both from the fever and *phthiſis* or Conſumption, that ſeemed ſo deplorable.

2. Obſervation.

In the mean time, whilſt he lay ſick, I viſited another, about 12. years of age, after the like manner affected. But this when I was firſt ſent for, having been ſick above a month, was reduced to the leanneſs of a Skelliton: beſides he was troubled with a *vertigo*, with a noiſe in his ears, and deafneſs, and alſo with a violent cough with yellow, and as it were conſumptive ſpittle: his pulſe was quick and feeble, his urine red and thick, his appetite much dejected, his ſpirits ſo languid, and his ſtrength ſo caſt down, that he could not keep out of his bed: I gave this Youth to drink often in a day, water diſtilled from milk, with ſnails and temperate herbs: beſides I ordered him an open decoction, ſuch as is in uſe for the Rickets, to be daily taken inſtead of his ordinary drink; by the help of which Remedies, he was reſtored to his health, in a months ſpace. At this time I was ſent for to many other people, of every age and ſex, diſtempered by the ſame diſeaſe, now clearly Epidemical; for it running thorow whole families not only in this City and the neighbouring parts, but in the Countries at a great diſtance, as I heard from Phyſitians dwelling in other places, increaſed very much. Thoſe for the moſt part labouring with this fever, ſo be they were otherwiſe whole, grew well by the fit uſe, and order of medicine and dyet: but it hapned very often but ill to thoſe who were indued with a weakly conſtitution of brain and nervous ſtock, or broken with age; but not ſeldom the caſe of the ſick became dangerous becauſe the Phyſitians were not wont to be ſent for preſently after the beginning of the diſeaſe, yea, ſcarcely before it had more deeply ſpread abroad it roots, and the opportunity of healing was paſt.

3. Obſervation.

For that reaſon, this fever became very deadly, in the family of a certain Noble man among his children, originally obnoxious to Cephalic diſtempers. About the vernal Æquinox, a Boy of about eleven years of Age, began to be ſick: At firſt without any vehement heat, or thirſt, a dejection of appetite, and want of ſtrength came upon him: Beſides, an almoſt continual giddineſs did trouble him, with a frequent danger of fainting, that he often thought he was juſt dying. By the advice of a certain woman at-

attending him, they daily gave him Clisters: then, when from the foulneſs of the Mouth and Tongue, manifeſt ſigns of a Fever appeared, this Emperick on the fifth day, gave him a vomit of the infuſion of *Crocus metallorum*, and on the ſeventh day a Cordial Powder being adminiſtred, ſhe incited the ſick Youth covered with blankets to ſweat: but preſently he began to talk idly, complained that his Cap was fallen into the water, by and by becoming ſpeechleſs, within four hours, whilſt I was ſent for, he expired before I came.

A little while after, the ſame diſeaſe fell upon his younger Siſter: whoſe ſickneſs however becauſe it was accompanied with a frequent and humid Cough, was thought at firſt to be only a taking of Cold; but within a few days, this Cough became plainly Convulſive: ſo that, whilſt ſhe coughed, the *Diaphragma* being carried upward, and with a renewed *Siſtole*, held ſo a long time, ſhe made a great noiſe as if about to be ſuffocated: then this little maid growing more apparently feveriſh, complained of thirſt and heat, and lay all night without ſleep with a mighty agitation of her body, and begau to talk idly, after the ſame manner as her brother, of her coat being fallen into the water; and when all things grew worſe, ſhe began to be tormented with Convulſive motions, firſt in her Limbs, by and by in her face, and then in her whole body: the *Paroxyſms* coming by often turns, twice or thrice in an hour, did moſt grievouſly trouble her, ſo that this little wretch, within the ſpace of 24. hours, after the Convulſive Diſtempers began to grow more grievous, her animal ſpirits being almoſt quite ſpent, ſhe died; whilſt the Convulſive fits tormented her, her pulſe was very much diſordered, and often intermitting, alſo a frequent vomiting moleſted her. Being ſent for to viſit this maid, alſo too late, a little before her death; when I could contribute nothing to the proroguing of Liſe, I endeavoured what I could, to find out from her death, the knowledg of the aforeſaid diſeaſe, therefore having got leave to diſſect her body, the reaſons and marks of the Symptoms chiefly urging in this fever, more clearly appeared.

The knowledg of the diſeaſe found out by diſſecting the Carcaſe.

Opening therefore firſt the lower belly, I found all the bowels in it ſound enough and well furniſht: The *Ventricle* altho tired with empty vomiting, contained nothing beſides the Liquor, lately taken in at the mouth: for neither in it, nor in its *Appendix*, were worms, or ſharp humors found which are wont oftentimes to give a cauſe to theſe kind of Convulſions: the ſmall guts, were in many places involved: to wit, the *Convex ſuperficies* of one part, was thruſt into the concave of another, as into a ſheath, and hid far in it, which indeed I judg to have hapned wholly from the convulſive motions of thoſe bowels: for whilſt by vehement Convulſion, excited from the nervous *origine*, the oppoſite *fibres* being drawn together, did work the ſame Inteſtine into contrary motions, it eaſily hapned that a part of the Inteſtine of the *Ilion*, being carried upward, might run into the hollowneſs of the other, being ſnatched downward.

The *Thorax* being opened, the fleſh of the Lungs appeared very red, and as it were ſprinkled with blood, yea in ſome places as it were livid, and almoſt black: out of the ſame wherever it was cut, there flow'd forth a thin and frothy matter. Certainly this ſhew'd, that the feveriſh matter, or the ſerous impurities of the boiling blood, being ſoon impacted in the Lungs, did ſo ſtuff up their pores and paſſagss, that the blood it ſelf, being in its wonted and free Circulation, there ſtagnating, and being extravaſated, did excite a certain Inflamation.

We found a no leſs clear tract of this ſo deadly diſeaſe in the head: for the ſhell of the skull being removed, preſently the veſſels, creeping through the *meningæ*, were ſeen to ſwell very much with blood, as if almoſt the whole maſs of blood were gathered together in the head: for the veins being cut or broken, about the inwards of the lower and middle belly, little blood flowed forth: Beſides, thoſe membranes where they cloath the *Cerebel*, and being higher ſpread, divide it from the brain, being ſprinkled in very many places with extravaſated blood, were noted to be of a black purple colour; that it was not to be doubted, but the *Phlegoſis* or Inflamation round about excited, was the cauſe of the ſo cruelly infeſting Convulſions. Theſe coverings being taken away, the ſubſtance of the brain was ſeen to be altogether moiſt and watered above meaſure with a watery humor: yea, its rine or bark being taken off, all the *ventricles* were full of a limpid or clear water, of which kind of very clear Liquor, there was judged to be more than half a pint.

The Pathologie of the aforeſaid Fever.

From theſe appearances, the *Pathologie* of the aforeſaid fever is eaſily collected: to wit, in this ſickneſs, as alſo in many others, the blood feveriſhly growing hot, preſently depoſes its recrements, both into the Lungs, and into the brain; wherefore a ſerous Colluvies, or watry heap, did preſently overflow the conſtitution of either; then, becauſe the blood being hindred, both here and there, from its due circulation, it

began to grow into a very great heap, about the confines of the affected parts, and at length to ſtagnate, and to cauſe as it were a *Phlegoſis* or Inflamation: hence by reaſon of the *Serum* being plentifully heaped up in the Lungs, and baked by the heat, the troubleſome cough, with the thick and diſcoloured ſpittle, for the moſt part came in this diſeaſe; and by reaſon of the like affection, excited within the head, the *vertigo*, ſwimming, ſtupifaction, and other *Cephalic* paſſions, conſtantly ſeiſed on the ſick: which kind of Diſtempers in this little Maid, and in her Brother, by reaſon of the infirm conſtitution of the brain, before in either of them, being made more grievous, terminated in an *Apoplexy*. I might eaſily here propoſe many other Hiſtories of perſons ſick of this fever at that time, but from theſe but now recited, the Type of the aforeſaid Diſeaſe may be ſufficiently known: But becauſe the ſame fever happens almoſt every year, on ſome prediſpoſed; and perhaps by reaſon of an evil conſtitution of the year, may hereafter at ſometime become *Epidemical*, it will be worth the while to repreſent ſome Method about its Cure.

The Curatory Method.

Concerning which, firſt of all take notice, that in this fever no Critical days were to be obſerved, as in the vulgar continual fevers: for the blood as ſoon as it began to grow hot, poured out a part of the morbifick matter, as yet crude, and not overcome, from its embrace to the head, or breaſt: wherefore it were vain to expect that the blood ſhould ſuffer the heterogeneous particles to be heaped together, in its maſs to a fulneſs, that from thence a flowring of putting forth ariſing, at the ſet intervals of times, it might thruſt the ſame ſubtilties out of doors: yea rather this growing hot glows not with a great and open burning: but like a fire covered with chips, ſends forth a moiſt ſmoke or breath, rather than a flame: But ſo that from thence by reaſon of the nervous juice being depraved ſoon in its diſpoſition, and not rarely, becauſe of the lungs being ſtuffed with the conſumptive matter, the convulſive or phthifical or conſumptive ſymptoms, did moleſt chiefly in the whole courſe of the diſeaſe.

Bleod to be taken away at the beginning of the diſeaſe.

It behoves us to deſign the curative Intentions according to the various times of the diſeaſe, and the diverſities of the ſymptoms chiefly urging. About the beginning of this fever the taking away of blood ſeemed convenient almoſt to all. This kind of Remedy I often experienced with ſucceſs in little Children: for that by the means as it were another breathing place is opened to the maſs of blood, ſilently and covertly growing hot, and obtruding its ſoot or ſmoak on the more noble parts; and for that reaſon its impure effloreſcencies or puttings forth are drawn away from the brain and lungs. Therefore altho this fever of an ill Condition may be accounted as it were malignant, yet foraſmuch as the blood is not preſently apt to be coagulated, but to be too much poured forth, and to beſtow its ſeroſities on the nobler parts, to wit, the brain and lungs; therefore *Phlebotomy*, ſo it be adminiſtred in the beginning of the diſeaſe, is convenient almoſt to all.

For the ſame reaſon, *Cathartick* Medicines, and chiefly vomitory, are adminiſtred at the very beginning of the diſeaſe; for theſe do not only evacuate the *viſcera* of concoction, and ſo draw away the chief fomenting of the diſeaſe, and as it were its original, but beſides, they draw forth the ſeroſities from the blood, and ſo effect its cleanſing rather in the ſtomack and inteſtines, than in the head and lungs. Further by Emeticks, for that the receiving *Glandulaes* of the *Lympheducts*, are pulled with a great ſhaking, the ſuperfluities of the nervous juice, leſt they ſhould evilly affect the brain, and its dependencies, are expreſſed forth into the lower bowels: alſo for this end the belly is to be kept continually looſe by the uſe of Clyſters. But in the mean time, whilſt the blood being infected with the taint of this diſeaſe threatens the brain or *præcordia*, with the evil, it will not be faſe to attempt any thing with *Diaphoreticks*, or ſweating medicines, or *Diureticks*, or ſuch as evacuate by urine, or alſo with *Cathartick*s, vomiting and purging medicines: For theſe kind of medicines, foraſmuch as they greatly pour out the blood, and compel its ſeroſities into more open iſſuings forth, all the recrements being apt to fall away from the maſs of the blood are eaſily obtruded on the brain, or lungs, when they are of a more feeble conſtitution: So in the youth abovementioned, a loſs of ſpeech, came upon the raiſing of an untimely ſweat: Alſo I have known that *Sudorificks*, no other than chaley beats in the morbid diſpoſition of the lungs, have brought on a waſting or Conſumption.

Vomits and Purges are to be adminiſtred.

Phlebotomy therefore, and if need be, vomiting or purging either one or other, or both, being to be made uſe of at the beginning of the diſeaſe, the other intentions ſhall be to draw away the morbific ſeroſities of the blood, apt to flow forth on the head or breaſt, and to derive them gently by other ways of evacuation, and to put them forth of doors. To this end *Veſicatories* or bliſtering plaiſters ought to be applyed to the nape of the neck, or *Parotida* or *jugular Arteries*, or to the Arm-pits, or the Groin, or about the Thighs or Calves of the legs, ſometimes in this part, ſometimes in that;

Bliſtering plaſters.

to

to wit, that the little Ulcers being here and there excited, and continually running, might plentifully pour forth the *ſerum*, imbued with the morbid and heterogeneous particles.

But Remedies gently carrying the *ſerum* into the Reins and urinary paſſages, are moſt often adminiſtred with ſucceſs: For this buſineſs, *diuretical Apozems* and *Julups* are to be ordained after the following forms. *Diureticks.*

Take of the Roots of *Scorzonera*, *Cherfoil*, *Graſs*, and of *Eryngoes* candied, each ſix Drams, one *Apple* cut, of the leaves of *pimpinel*, *meadow-ſweet*, each one handful; of *Raiſins of the Sun*, an Ounce and a half, of *Harts-horn* burnt two Drams; being cut and bruiſed, let them be boiled on a clear fire, in four pints of ſpring water to the conſumption of the third part; to the ſtraining being cleared two pints, add of the *Syrrup* of *green Cytorns*, or *Violets*, two Ounces, of *Sal prunella* one Dram and a half, make an *Apozem*. The Doſe four to ſix Ounces, thrice in a day. *A diuretick Apozem.*

Or into that ſtraining, put 15 *blanched ſweet Almonds*, and of the four cold ſeeds, each one Dram; being bruiſed, make an Emulſion according to Art. *An Emulſion.*

Take water of *Dragons*, and of *black-Cherries*, each four Ounces, of *ſcordium* compound two Drams, of *Threacle* water an Ounce and a half, of *Syrrop of Clove-gilliflowers* two Ounces, of the *ſpirit of Vitriol* twelve drops, make a Julup. *Julup.*

Take oftentimes in a day, in ſmall Beer or Poſſet-drink, half a Dram, or two Scruples of *Sal prunella*. *A Powder.*

Beſides in this Fever, medicines gently ſweating, of that ſort chiefly which reſtores the animal ſpirits, and defends them from any heterogeneous *Copula*, are of very great uſe: wherefore, either the *powder of Pearls*, or the *ſpirit of Harts-horn*, or of *Blood*, in a moderate Doſe, are adminiſtred twice in a day, *viz.* Morning and Evening. *Gentle Diaphoreticks.*

Cliſters are to be given almoſt every day; and if it be thought fit, a gently looſning *purge* may be taken once or twice in a week. *Cliſters.*

The diet preſcribed ought to be ſlender, as in other Fevers, let them be wholly interdicted from fleſh, or broth made thereof, only let the ſick feed on Grewel, or Barley-broth, and let their drink be ſmall Beer or Poſſet-drink. *Diet.*

If that, notwithſtanding, any preventive Phyſick, the Morbific matter ſhould lodge in the Brain, or Lungs, or both together, ſo that a diſſolution, or inordination of the animal function, or alſo a violent Cough ſhould aſſault them; it muſt be conſider'd, what is to be done in either ſtate of the Diſeaſe, carried forth after this manner into an evil condition; but then the curative Indications ought to reſpect the ſtupor, or madneſs, or cough: and laſtly, if in the declination of the Diſeaſe, theſe ſymptoms do remit, proper Remedies are to be adhibited againſt the *Atrophie*, as it were the laſt fortreſs of this Fever.

Firſt, Therefore if the morbific matter, as it is often wont, being brought to the brain, ſhould bring in an inſenſibleneſs, or a ſoporiferous or ſleepy diſtemper, remedies drawing it another way, and deriving it ſome way from the head; and beſides, ſuch as ſtir up the animal ſpirits, and take away the impure *Copula*, ought carefully to be adminiſtred; wherefore in this caſe, the uſe of Epiſpaſticks or ſuch things that draw the water outwardly, ſhould be much increaſed, and let the *ſpirit of Harts-horn* be exhibited almoſt every ſixth hour, in a little bigger Doſe; let blood be alſo taken by the ſucking of Leeches, more largely from the jugular veins, the *Salvatella*, or the ſedal veins. If the Diſtemper remits not, the head being ſhaven, let *Emollient fomentations* be often applied thereto: Further, let *Cupping-Glaſſes*, *Plaiſters* and *Cataplaſms* be laid to the ſoals of the feet, and other means of adminiſtrations, ſuch as are commonly preſcribed for the curing of the ſtupor, or inſenſibleneſs, ought to be uſed: in like manner, if on the evil, or no *Criſis* of this Fever, a Phrenſie, or madneſs ſhould come, Remedies appropriate to thoſe Diſtempers are made uſe of. *The Curatory method in the unſenſibleneſs and madneſs.*

Secondly, But if either with, or without this ſort of diſpleaſure brought to the head, the Lungs alſo have taken the evil of this Diſeaſe, ſo that the ſick, not yet free from the Fever, ſeem to fall into a waſting, or Conſumption, with a troubleſome Cough, with abundance of thick, and often diſcoloured ſpittle; Medicines commonly preſcribed for ſuch kind of Diſtempers are convenient enough; wherefore pectoral Decoctions, Electuaries, Syrrops, diſtill'd waters of Milk and Snails, and other Remedies of the like nature, ought diligently to be made uſe of; the forms of which may be found in the before-deſcribed Caſes. *In the Cough.*

Thus far we have deſcribed the continual Fever, for the moſt part Convulſive, and ariſing no leſs from the fault of the nervous juice, than of the blood: I will here further propoſe an example of a Diſeaſe, having the likeneſs of an intermitting Fever, but radicated chiefly in the nervous juice; the nature of which kind of Diſtemper, for that it is very rare, and truly pertinent to our convulſive *Pathologie*, will appear from the following Hiſtory.

A noted

A very rare Observation.

A noted Woman very young, and indued with a more weak constitution of brain and nervous stock, and for that cause very obnoxious to Convulsive Distempers, after she had conceived with Child, about the fourth month of her being big, from cold being taken, she was grievously afflicted with Astmatical fits; and besides, with a frequent sinking down of her spirits: but by the use of Remedies, indued with a volatile Salt, she grew well within a fortnights space; but after that, about fourteen days, an unwonted and truly admirable Distemper fell upon this Gentlewoman.

One morning, awaking after an unquiet sleep that night, she felt a light shivering in all her body, as if she had had the fit of an Ague: frequent yaunings and reachings, with an endeavour to vomit followed thereupon: then her Urine, which was but now of a citron colour, and of a laudable substance, became pale and wateriſh, and was rendred at every turn, to wit, almost every minute of an hour: moreover, about her loins, and *hypochondria*, and in other places, pains with light Convulsions running about here and there, were excited: which kind of symptoms plainly Convulsive, with her frequent making of a lympid Urine, continued in the Morning almost to the Evening, in which space of time, a great quantity of water, at least three times more than the liquor she had taken, was rendred; in the mean time, neither was the heat great, nor did thirst trouble her, nor was her pulse encreased: In the evening the aforesaid Distempers ceased, and her Urine became citron colour and moderate; and besides, all night she enjoy'd a moderate sleep; then the morning following, about the same hour, the fit returned, accompanied altogether with the like symptoms, and so daily acted the same Tragedy.

The reason of it.

Visiting this Gentlewoman, after she had been sick in this manner for twelve days, I framed the Ætiologie of the aforesaid case, to wit, That this Disease, chiefly radical in the nervous stock, did depend upon the effervescency and flux of the humour, watering the nervous parts: For it might be suspected, that this water being diffused from the blood, made degenerate by reason of the suppression of her Terms, upon the brain and nervous stock, became more sharp and serous than it ought to be, and for that cause incongruous to the containing parts: wherefore, being gathered together to a plenitude, by the nights sleep, it did stir them up or provoke them, for the expulsion of it, every where into wrinklings and contractions: hence shiverings, yaunings, stretchings, and wandring pains were excited in the whole body: Furthermore, from the solid parts, after this manner contracted and shaken, not only the nervous liquor, but also the nutricious every where laid up in the solid parts, but not truly assimilated, were shaken off: and then, either *Latex*, being exterminated from its receptacles, and received by the Veins, or Lymphaducts, or water carrying Vessels, was render'd to the mass of blood: from whose bosome, before it had acquired a lixivial tincture from it, being at last cast forth by the reins, constituted a clear and copious Urine: But that this Distemper observed such exact periods, the reason is, because the nervous water being supplied with an equal dimension, did arise to a fulness of running over, daily at the set time: Therefore also, the Urine appeared concocted and yellow, before and after the fit, because then its matter consisted only from the *serum* of the blood: Afterwards, during the Convulsive fit, the limpid humour being shaken off from the solid and nervous parts, and passing quickly thorow the blood, adulterated the colour and the quantity of the Urine. I prescribed to this big-bellied Woman, Phlebotomie, and besides, a Powder composed out of *Coral*, *Pearls*, *Ivory*, and other *Cardiacks*, to be taken thrice in a day in a proper liquor; morning and evening she took of the *tincture of Antimony* twelve drops (whose singular effect in the too great flux of Urine, I have many times experienced:) By the use of these, all the symptoms ceased in a short time.

CHAP.

CHAPTER IX.

Of Univerſal Convulſions, which are wont to be excited, becauſe of the Scorbutic diſpoſition of the Nervous juice.

Univerſal Convulſions by reaſon of the Scorbutic diſpoſition of the nervous juice.

THus much concerning univerſal Convulſions, diffuſed thorow the whole nervous kind, which come upon Fevers; and eſpecially concerning the Convulſions, which are wont to be excited in the commonly called *malignant hectick Fever*. There yet remains (which was propoſed in the third place) for us to ſhew, by what means, and from what cauſes, univerſal Convulſions are induced, without Poyſon or Feveriſh infection, by reaſon of the ſcorbutick, or otherwiſe vitious dyſcraſie or evil diſpoſition of the nervous juice. For indeed, the liquor watering both the nerves and the nervous parts, ſometimes deſcending from its natural diſpoſition, is ſo much ſtuffed with heterogeneous and exploſive Particles, that the animal ſpirits admitting an incongruous *Copula*, every where growing to themſelves, are irritated into continual, as it were cracklings, or convulſive exploſions: Theſe kind of affections of the ſpirits are either divided or ſeparated, between which no communication or dependency intercedes, *viz.* When many parts of the body are troubled at once with ſo many Convulſions proper to themſelves, which do not come ſucceſſively one from another, but are terminated in the ſame muſcle or member where they begin: After which manner, I have known ſome ſick people, who have had their Muſcles and Tendons all at once in their whole body, perpetually to leap forth with ſo many diſtinct Convulſions. Or, Secondly, the Convulſive Diſtempers, which are excited in the whole nervous kind together, are continued or connex, which ſucceed one another with a certain perpetual viciſſitude continued between themſelves: Foraſmrch as inordinate motions, almoſt of all the members, mutually relieving themſelves, being riſen in one part, preſently paſs over to others. For ſo *Horſtius* relates of a Maid obnoxious to Convulſive motions, whoſe Members and Limbs not only were forced into divers manner of flections and diſtortions; but beſides, as if agitated by an evil ſpirit, not being able to ſtand in a place, ſhe was neceſſitated to run up and down here and there, and to dance and leap in the Hot-houſe; nor could be hindred from it by any force or chiding, but that ſhe would run here and there; now ſhe would caſt her ſelf on her feet, now impetuouſly fling her ſelf after another manner; for if ſhe did endeavour never ſo little to be quiet, preſently her *Præcordia* was moſt grievouſly afflicted. Wherefore, the buſineſs of our preſent task is, to enquire a little more exactly into the nature and cauſes of either Convulſive affection, to wit, both of that which is affected through the very much leaping of the Tendons and Muſcles together; and of this, which is cauſed through the madneſs and inquietudes of the members of the whole body: that from thence it may appear, what method of healing ought to be adminiſtred in either caſe.

Two kinds of theſe, viz. *Separate, and connex or joyned together.*

The nature of the broken Convulſive diſtemper.

As to the former kind, it eaſily appears, that theſe kind of Diſtempers are not ſimple, but complicated, to wit, of a Convulſion and Palſie. For the Muſcles and Tendons are perpetually urged with Convulſive motions, notwithſtanding, the ſick being made weak, they are not able ſtrongly to move any of their members, or their whole body: yea, to theſe Diſtempers, pains equally diffuſed thorow all their Limbs are adjoyned. Hence we may infer, that the animal ſpirits are imbued with a manifold *Copula*, *viz.* both with exploſive, and alſo narcotick or ſtupifying, and in ſome ſort irritative or provoking Particles: ſo that, although being alway burthened, they enter into exploſions, yet, not many together, nor indeed any haſtily or ſtrongly are exploded, by reaſon of the other interjected Particles of another kind; wherefore the motive force does not long continue, but is ſhort, and as it were interrupted: juſt as if Gun-powder being kneeded with ſome muddy ſubſtance, ſhould be fired: for then the whole maſs is not let off at once, with a noiſe, nor does one heap preſently fire another, but a few grains only, and thoſe ſucceſſively, to wit, one a little while after another, with ſmall crackling noiſes, are let off or exploded: In like manner the nervous liquor is ſtuffed thorowout with Convulſive particles, which even cleave to the ſpirits: but foraſmuch, as ſome narcotick, and other painful ones are mingled with them, the elaſtick force of the former, however laſting, and greatly diffuſed, is yet much broken, and every where cut off.

For

An Observation.

For the illustrating this kind of broken convulsive Distemper, I will here describe a very notable case of a certain Gentleman lately living in this neighbourhood: which being truly admirable, not any writings or observations of Physitians have scarce shewed the like. An honourable Gentleman, whom I knew, sprung from Parents and Grand fathers obnoxious to a someways morbid disposition, either of the brain or nerves, about the hight or beyond the strength of his Age, the fruit of this diseased race began to punish him: for first of all, he was wont to be tormented with a debility and numbness of his Limbs, and with light Convulsions; with which kind of Distempers, when he had a while laboured, at length for cure sake going to the Bath, having used too much the hot Baths, instead of a remedy, he brought back only an exasperation of the Disease, that from that time the aforesaid symptoms did not any more torment him by fits, but almost continually, to wit, the Convulsive motions, and painful extensions, did incessantly exercise every Limb, yea, every part of his Body, so that all the muscles were perpetually drawn together, with repeated leapings all at once, and that not without great torment: The only means he had for quieting them, was to exercise his whole body, sometimes some of his members, perpetually with a local motion: for so long as he was awake, he was necessitated to be rock'd in his Bed, or on his Couch, or to be carried in a Coach, or to have his members press'd or rubb'd; for which end they had made for him a Bed, and a Chair set upon bow-fashion'd feet, such as are on Childrens Cradles, in which, when he lay down or sat upright, he was moved up and down continually, with a tottering or rocking motion; which unless he did, he was infested with most cruel pain, and horrid extensions of his muscles: This kind of daily trouble of the Convulsive Distemper, in the night-time, and presently after sleep, entertain'd much more grievous symptoms: for being newly awaked, his whole body presently was wont to quake, his muscles to be exercised with painful stretchings, every Limb to be wetted with a squalid or ill-favour'd sweat, as if in the agony of death, which was so very Corrosive, that, like *aqua fortis*, unless they presently wiped it off, it quickly eat and rotted the Linen. The sick man, during this conflict, was tormented for many hours, between the sweats and shiverings, until being quite tired out, sleep creeping upon him, brought him some ease; but if at the approach of the fit, he was presently taken out of his Bed, he was better, and so prevented the wonted cruelty of the Distemper: Therefore, as soon as he was awaked from sleep, though it hapned within half an hour, immediately to avoid the torture, his servants being called, they took him out of his Bed: As to his Appetite he was well enough, he eat without loathing, nor was his stomach disturb'd with what he eat: But he did often complain of the pain of the heart, and sometimes a troublesome spitting, with a stink in his mouth, as if he had taken *Mercury*, molested him for many days. All hot things, whether Food or Physick, did not agree with his constitution; he did not dare to taste, either Wine, or strong Beer. In the first years of his sickness he abhor'd the very sight of the fire, afterwards becoming weaker, though the winter was sharp he would not sit near the Chimney; his Urine was always of a citron colour, which if it were evaporated in an earthen vessel, over hot coals, saltish fæculencies remained in the bottom, to above half the liquor; his belly was continually bound, and never put forth its load, unless provoked by a Purge or Clister: Yea, besides the Convulsive motions, a spurious Palsie possessed every member of his whole Body; for he could not lift up his hand, nor step a foot forward; his tongue shaking, brought forth his words but imperfect; but sometimes, when his mind was carried forth by some sudden occasion of joy, he would be able, his spirits being raised with a wonderful strength, suddenly to rise out of his Chair, and without the help of another, to stand upright, and to jump, which interval however lasted scarce a minute of an hour, but that his members flagg'd, and were affected with their wonted languor and trembling. When this worthy Gentleman had been sick after this manner above twelve years, and had consulted the most famous Physitians in all *England*, and had tried very many Remedies, and almost of every kind, *viz.* Antiparalytick, Antiscorbutick, drying Diets, sweating Medicines, Purges, Caustick, Baths, Liniments, yea, and had twice tried Salivation, could find no cure by any method of healing; wherefore, all hope of cure being wholly laid aside, for the latter seven years of his life, he made use of only Remedies, chiefly respecting some symptoms, *viz.* he took thrice in a week a solutive Medicine of *Senna* and *Rubarb* with correctives, now in form of a Syrrop, or of an extract another time; every night he was wont to take a Dose of an opiate, out of conserves, and temperate *Species*: Besides, as occasions served, he had ready a Julup, to be taken when his spirits fainted: moreover, he continually drank Beer made of Oaten Mault, altered with temperate and diuretical herbs. By the use of these he pass'd over at least seven years, without any great alteration for the worse; at length, old age coming on him,

together

together with the Diſeaſe, more cruel fits of Convulſions, not as at firſt after ſleep, but as ſoon as he was warm in his bed, invaded him, that he was forced to abſtain altogether from his Bed, and rarely put off his clothes, unleſs to ſhift his Linen: from hence tranſpiration being hindred, the ſerous recrements, and others wont to be evaporated, were fixed on the Lungs, which at firſt brought in a frequent or ſhort breathing, afterwards an Aſthmatical Diſtemper; and laſtly, a deadly conſumption or waſting.

The reaſons of the ſymptoms chiefly tormenting.

If the reaſons of the aforeſaid ſymptoms be ſought after, it will be eaſie to deduce all theſe evils from a depraved conſtitution of the Brain and Nervous ſtock, and more immediately from the diſcraſie, and fault of the juice watering thoſe parts. For when that Liquor, in which the animal ſpirits do abound, was, as to its temper, highly ſharp and corroſive, like *Stygian* water; and as to its mixion, was ſtuffed full of both narcotick and exploſive Particles, it is no wonder, becauſe the ſpirits being very much burthened, and for that cauſe reſtrained from their due expanſion, that they ſhould be forced every where into ſmall exploſions, as it were cracklings; and that the containing bodies, being looſed from their due extenſion and ſtrength, ſhould be alſo continually irritated into painful corrugations or ſhrinkings up.

The growing worſe preſently after ſleep, whence it proceeded.

Thoſe Convulſive Diſtempers did more ſharply infeſt after ſleep, becauſe the heat of the Bed, did exuſcitate or ſtir up the heterogeneous Particles of the nervous juice, and rarifying them, as it were, compell'd them into exploſions; then alſo, becauſe the nervous parts did imbibe its juice in ſleep, and a more plentiful proviſion of the morbific matter, brought together with it; which being filled to a plenitude, at the firſt inſtant of waking, they immediately endeavour to ſhake off what is troubleſome. For this reaſon it is obſerved, that the pains of Scorbutical people, and the fits of Aſthmatical, are made worſe by the heat of the Bed, and by ſleep; therefore as in theſe, preſently to leave the bed, was wont to give eaſe, ſo likewiſe it did in our ſick man: But that the trouble, excited by the continual leapings, and painful extentions of the muſcles, was ſomewhat allayed by the local motion, or moving from one place to another of the body, or members; the reaſon is, becauſe the animal ſpirits, whilſt they are compelled to divers actions from without, they remit whatſoever inordinations are excited from within: for as in pain, and itching, which are lighter Convulſions, it helps, to preſs, rub, or ſcratch the affected part; ſo the Convulſive motions of the muſcles and tendons, are ſomewhat pleaſed, by the inordinate agitation of the whole body, or the members.

Why allayed by motion.

The ſpitting.

As to the *Ptyaliſmus*, or copious ſpitting, with the ſtinking breath, which was wont to return at uncertain intervals, we do ſuppoſe that might perchance proceed from *Mercury* ſometime ſecretly given, although I have ſeen many labouring both with Convulſive, and alſo Scorbutick Diſtempers, in whom this kind of perpetual defluxion of ſpittle from the mouth was very troubleſome, without any ſuſpition of *Mercury*; alſo ſome (as ſhall be told hereafter) on whom a ſalivation coming (the exploſive matter being after this manner critically evacuated) help'd the Diſeaſe: moreover, it is likely that this Diſtemper was produced from the meer recrements of the nervous juice; and that the ſalival paſſages, when many, and enough were open, did receive, and convey forth of doors, the ſuperfluities plentifully depoſited in the *Glandula's*, from the Nerves, and alſo from the Arteries.

Why this ſick man obtained ſome truce from pains.

As to the lucid intervals, whereby the ſick man us'd to obtain ſome truces, though ſhort, the cruelties as it were of the Diſeaſe being mitigated, as when but now his ſickneſs had bound him to his chair, he was able on a ſudden to leap up, and walk about; but yet, this unlook'd-for ſtrength being vaniſh'd, by and by falling again into his wonted languiſhment: I ſay, theſe kind of motions of labouring Nature, proſtrate under a great burthen, are its utmoſt endeavours, and ſome more ſtrong inforcements, to wit, whereby for a moment of time ſhe recollects her ſelf, and attempts as it were to ſhake off the yoak of the Diſeaſe; but becauſe ſhe is not able to ſuſtain long this ſtrife, ſhe quickly relapſes, and lies down under her former burthen. Truly it is a wonder, how much above the ſtrength of Nature, Anger, and Fear, and ſome other Paſſions of the mind, do ſtretch the nervous kind, and compel them to ſhew a force plainly ſtupendious: But theſe prodigies of her attempts, are only of a ſmall duration.

The ſecret leading cauſe of the aforeſaid diſtemper.

The conjunct cauſe of the aforeſaid Diſeaſe being after this manner deſigned, and the reaſons of the ſymptoms chiefly tormenting, being ſhown, it remains yet for us to inquire into the leading cauſe; to wit, by what occaſions the nervous juice being become ſo degenerate, at firſt brings in the Paliſie, and then leapings, or inteſtine Convulſions of all the muſcles: further, we ought to explain wherefore the fruits of this Diſeaſe, increaſing by little and little, came ſuddenly to maturity, by the uſe of the Baths; alſo wherefore this ſickneſs yielding to no Remedies, became uncurable.

As to the first, it may be said, that the sick Person, being sprung from Parents who were obnoxious greatly to Cephalic Diseases, had contracted originally an evil Constitution of the brain and nervous stock, so that within the 6th lustre (*i. é.* about the 36th year) of his Age, he began to be sick of a spurious Palsie, then, when the evident causes daily fixing the infection more on the blood and humors, did happen upon this remote hereditary cause (for there were many chances and unfortunate accidents, which continiually brought sadness, and melancholly upon this Gentleman) indeed therefore, the nervous Liquor being imbued above measure, with a fixed and Scorbutic salt, became highly sharp and irritative, like *aqua fortis*, or the Stagma's of *Vitriol*; and so continually incited the Spirits, and the bodies containing them into corrugations and contractions, just as the aforesaid Liquors when poured upon worms do the same thing.

Why this Distemper grew worse by the use of the Baths.

But that this disease, leasurely at first increasing, was quickly brought into a much worse condition, by the use of the hot baths, the reason easily appears: It is known by experience, that the hot Baths do very much exalt and quickly bring to the height, the Sulphureous-saline particles in the humane body, and otherwise morbid, which abound in the bowels and humors, *viz.* do render them more fierce by agitating them throughly, and force them from their first passages into the blood, and from thence into the brain and nervous stock, yea, and joyn together those that were before seperate, and idle, and incite them into a certain fermentation: wherefore, those who are hereditarily obnoxious to the *Gout* or *Stone*, and have not as yet suffered any fits of those distempers, very often feel the fruit of either disease in themselves to grow ripe soon by the use of the Baths: when therefore in this sick person, both the blood and Liquor watering the Brain and Nerves, were imbued both with narcotick or stupifying, and convulsive particles; and also when they did degenerate from their sweet and Balsamy Disposition that towards a saltish, and this into a sour, *Ciæmul* of a *Stagma* of *Vitriol*, the use of the hot mineral waters was so far from bringing help, that on the contrary, these evils, for that very cause, presently grew all very much worse: and the Disease, proceeding from the humors being so depraved, as to their temper and mixture, could never be cured by any medicines, no easier than vinegar may be reduced into wine.

When this Gentlemans body, being at last dead of the *Phthisis* or *Consumption*, was opened by me, we could find but very few foot-steps of these kind of most grievous Symptoms. Hence, as it appeared, the *Palsie* and *Convulsion*, did not depend so much on a thick and copious matter, heaped together somewhere in mines, as of an evil affection of the animal Spirits, who are subtle and invisible. I will lay forth, what was worthy taking notice of in the Anatomy of this Person.

Things worthy to be noted in the body being dissected.

The *Abdomen* being opened, the *Caule* (as is wont to be in most who die of a Consumption, and other Chronical Diseases) was putrified and almost consumed. In the mean time, the *Ventricle, Intestines, Pancreas, and Mesentery*, were well enough, to wit, the membranes were firm, well-coloured, and free from any ulcer, or hard swelling: There grew to the greater intestines certain excrescencies, like to the ears of a mouse; for that there were very many of these kind of things out of either side of the *Colon*, and right intestine, they shewed like twins at certain distances, like the branches of trees: The like I formerly found in a consumptive Person: The Reason of this seems to be, that the nourishment in Consumptive people, (tho it be deficient about the more solid, and outward parts, yet sometimes) within near the fountains of the nourishing juice, performs more than it ought, and for that cause, superfluous and unnatural additions grow forth.

The milt or spleen, which always is thought ill of, and of most Physitians condemned, for being the principal cause of the Scurvy, and of all other distempers, appear altogether blameless, and free from any fault: For, as in most sound people, we observed, it was of a darkish Colour, soft, and of an equal *superficies*, free from any obstruction, or swelling, indued with vessels, and fibres, distinct, and firm enough: out of its substance, flowed black blood when it was cut.

The Liver, (which indeed might be wondred at) was indifferently well, neither was it, from so long and grievous a sickness, become harder than usual, or scirrhous, or planted with little whelks, but it was somewhat big, and of a darkish colour.

The Kidneys, tho free from any ulcer, or gravel, were not however free from fault: for in the middle of the right Kidney, was seen a great cavity, distinct from the Tunnel, and much greater than it, full of clear water; the like I have very often found in hydropical people: But indeed, this perhaps arose from the *serum* depositted in that kidny, that could not easily be strained thorow its passages and pores; for that the *serum* subsisting therein, had in the beginning made for it self a little den, which afterwards

by

by degres was inlarged; and when for this reaſon, the ſecretion of the *ſerum*, and its paſſing forth by the *ureter* were ſomething hindred, its *Latex* reſtagnating into the blood, brought in the grievous trouble to the head; which indeed, was the rather to be ſuſpected, becauſe alſo the left Kidney being mightily extenuated and conſumed, contained many ciſterns and cavities full of clear water.

The Lungs growing on every ſide to the *Sternum*, (or part of the breaſt where the ribs meet) ſides, and *Diaphragma*, ſeem'd without any diſtinction of *Lobes*, of one ſubſtance only of putrid ſpongy fleſh, ſtuffed throughout with a frothy or ichorous matter: without doubt, the ſick man had not contracted this evil ſo long before, to wit, when he was not able to perform any exerciſe of the body, nor ſtay in bed that it might breathe out any thing more freely; the feculencies and recrements of the blood, which were wont to evaporate thorow the skin, being laid up in the Lungs, were the cauſe that they grew together among themſelves, and with other parts, and did vitiate their tone and conformation wholly, ſo that a Conſumption being at laſt ariſen, was the effect and product, and not the cauſe of the reſt of the Diſtempers wherewith he had been a long while miſerably afflicted.

In either ventricle of the heart, blood was concreted into a ſolid whitiſh ſubſtance, and baked like fleſh; which being formed near the cavities and proceſſes of the veſſels of the heart, reſembled the figure of a Serpent, with a manifold divided tail: than which indeed nothing is more uſual, in many dead People after long ſickneſs: The reaſon of which is, that the blood being without life, from long ſickneſs, and from thence circulated ſlowly about the *Præcordia*, begins to ſtand or ſtagnate in the heart, and depending veſſels, and by that means is congealed leaſurely into this kind of fleſhy concrete.

When the Skull was opened, we ſought among its contents, the chief cauſe of the Diſeaſe: The firſt thing that occurr'd was, the bulk of the brain was leſs than it ſhould be, and folded into fewer folds, from whence we ſuſpected, that the animal ſpirits were not plentifully enough brought forth: Further, the whole ſubſtance of the head was more moiſt than it ought to be, and wholly immerſed in a wet watery humor; that its covering, *viz.* the whole meninges were pulled aſunder, and the compaſſing or crevices, and all the ventricles run over with clear water. 'Tis probable, that this deluge of the brain had lately hapned, to wit, foraſmuch, as by reaſon perſpiration being hindred, and the ſecretion of Urine being but little, the ſeroſities gathered together in the bloody maſs, were carried to the head, and therefore the ſubſtance of the brain, and eſpecially the chancelled or chequer'd bodies were ſo wholly wetted and ſoked, that being cut, their ſubſtance could ſcarce remain compacted, but that it would flow away, ſomewhat after the manner of thick liquids: within the boſoms overlying and inſerted to the brain and its *appendix*, and the veſſels coming from them, the blood had concreted into little, round, hard, and as it were fleſhy balls, juſt like thoſe within the ventricles of the heart, and the veſſels hanging to them, which alſo lately, when the blood circulated ſlowly, we thought might happen for the ſame reaſon, for which the blood was coagulated within the *Præcordia*.

The trunk of the ſpinal marrow being drowned in clear water, was very much extenuated, that it could ſcarce fill half of the bony cavity or hollowneſs: which we thought to be effected by the deluge of ſalt *Serum*, in which it was as it were boiled.

The nature and the manner of the continued convulſive diſtemper being made.

So much concerning univerſal Convulſions, which being very much conjoyned with the Paralitick Diſtemper, are excited dividedly in many parts at once: There remains others which we call'd continued, becauſe being ſuddenly tranſlated from ſome parts to others, they mutually relieve one another, and compel the members, now theſe, now thoſe, and often the whole body, to be involuntarily moved, and diverſly bended or agitated. In theſe caſes the animal ſpirits, not only thoſe implanted in private corners, and mines, get to themſelves an exploſive *Copula*; and being ſome how ſatisfied or irritated, ſtrike it off by certain turns; but when the whole maſs of the nervous Liquor, abundantly abounds with elaſtick particles, they then every where cleaving to both the ſpirits implanted and flowing in, for that reaſon ſtir them up into continual Convulſions: But foraſmuch, as not all the ſpirits at once are not able, however prediſpoſed, to be exploded, (becauſe within the nervous paſſages there is not room large enough for their ſo great agitations) therefore the exploſive force ariſing in theſe, or thoſe parts, is by and by transfer'd from thence unto others, and ſo to others, and ſo like fire-drakes, or wild-fire, it runs wandringly here and there, moſt ſwiftly creeping from theſe Limbs to thoſe, and then preſently from all into the *Præcordia* or *Viſcera*, and back again. That the Image of thoſe kind of Diſtempers may be known, we will here propoſe ſome more rare caſes, of ſick perſons, whom ſometime paſt I endeavoured to cure.

1. *Observation* A very fine and religious maid, tall and slender, begot of a Father sickly and obnoxious to most grievous Distempers of the nervous kind, about the 20th year of her Age, was afflicted for many days with an head-aeh, very cruel and periodical; at length, at that time of the winter solstice, 1656. the pain of her head ceased, but instead of it, a mighty Catarrh followed, with a thin and copious spitting, also an ulcerous distemper of the nose and throat; when she had for some time endured this trouble, at length, by the prescript of a certain Woman, receiving the fume of *Amber* by a tunnel into her mouth, she was suddenly cured, to wit, the Catarrh, or violent Rhume ceased suddenly, but from thence she complained of a notable *Virtego*, with a pain in the head, and of the tingling noise of the ears: on the Third Day, the tendons of the hinder part of her neck, were pulled together, that her head was bended now forward, now backward, and now of one side, sometime it continued stiff and unmovable; a little after this, the same kind of Convulsive Distemper invaded the outward members and Limbs of the whole body, her arms and hands were wonderfully turned about, that no jugler or tumbler could imitate their bendings, and rollings about; she was necessitated to spread abroad her leggs, and feet, here and there, to strike them against one another, and to transpose or cross them by turns: After this manner either sitting in a Chair, ot lying in a Bed she was perpetually afflicted with these Convulsive motions, unless when overwhelmed with sleep; and when she did a little restrain her members from the great labour of the Muscles, presently she was taken with a difficult and short-breathing with a sense of Choaking; but in the mean time, her eyes, jaws, mouth, and lower bowels, remained free from any Convulsion; neither was she troubled with vomiting, belching, nor any inflation of the belly and *hypochondria*: Besides she was still her self, and had truly the use of her memory, understanding, and phantasie, she did, nor said any thing madly or foolishly: but in these wonderful evils she shewed an admirable example of Christian fortitude and patience, even with godly and discreet speeches; her appetite was soon lost, so that she took any meat or aliment very unwillingly; thirst continually troubled her, and her strength was grown so feeble, that she could not stand or walk, her urine was of a Citron colour, very full of saltness, on whose *superficies* grew little tararous skins.

When I was sent for to this Gentlewoman, on the Sixth Day of her Sickness, I framed the Ætiology of this kind of admirable distemper: For the consideration of her father, who at that time was sick in the same house, with most grievous Convulsive passions, kept me, that I did not with many others, refer all things to the delusions of witches: wherefore, that I might seek out the natural causes of these Symptoms, it was in the first place plainly to be suspected that this Gentlewoman had contracted hereditarily the seeds of Convulsive Distempers, which at length, about the flower of her age, broke forth into this kind of fruit; for when her blood was very much imbued with heterogeneous explosive particles, they at length (as is wont in such a disposition) began to be poured into the head, and there to be fixed: being therefore first deposited in the *Meningæ*, they induced the huge periodical head-ach; then afterwards, the same matter having accidentally shifted its place, falling down into the sinks of the throat and mouth, changed the *Cephalage* or head-ach, into a *Catarrh* or *Rhume*: and when lastly by an untimely use of the adminiſtred remedy, the defluxion stopped, the morbifick matter flowing back into the brain, brought the *Vertigo*, and then, being thrust forth on the nervous stock, it excited the aforesaid Convulsive Affections.

The reason of the aforesaid cause. As to the formal Reason, or the means of generation, whereby the Convulsive matter, falling down into the nervous stock, did produce these admirable Symptoms, we may lawfully suppose, that the same being thrust forth from the Confines of the head, being yet more firm, into the spinal marrow, and its *Appendix*; and being like a malignant ferment, it first infected with heterogeneous and highly explosive particles, these parts of the juice watering the whole mass; which cleaving to the spirits, every where disposed thorow their whole *series*, and agitating them, as it were with a certain fury, did stir them up into continual explosions: When in truth, the nervous juice, as is said, was so fermented by the inflowing of the Convulsive matter, that which did otherways water the containing parts, with a gentle falling on them, and through the same did pass over the animal spirits, with an equal expansion; now the same did torment the nervous fibres, with various contractions and corrugations or shrinkings up, and did hinder both the spirits flowing in, being too much burthened with an heterogeneous *Copula*, from their due irradiation, and also variously moving those implanted in every part, did incite them, as it were with a diabolical Inspiration, so that no more obeying the Empire of the will, they ran into inordinate motions, and did renew them, translated rapidly here and there, with a perpetual reciprocation.

But

But, altho the heterogeneous particles, being poured forth with the blood into the brain, and thence thruſt forth into the nervous ſtock, did not enter rightly the beginnings of all the Nerves, but chiefly, and almoſt only, the ſpinal marrow, and its nervous ſhoots; ſo that the internal *Viſcera*, alſo the parts of the eyes, mouth, and face, remained free from any Convulſion: yet, that ſame exploſive force being hindred by ſome violence, whereby it entred leſs in the outward members, preſently like wild-fire, a way being found, it was wont to run into the *Præcordia*, and bowels of the lower belly, *viz.* becauſe the inflowing ſpirits being ſtruck with a certain fury, and requiring a larger ſpace, in which they might exerciſe their madneſs; being excluded from one place, preſently enter another ſomewhere open: wherefore, if that fury had been repulſed both from the members, and the *Viſcera*, no doubt but it would have flown back on the brain, and brought thither madneſs, or as it were an epileptical inſenſibleneſs: which ſymptoms indeed hapned to be wanting, for that the brain of this moſt ingenious Gentlewoman, being indued with a more firm conſtitution, did take from the nervous liquor freſhly inſtilled, whatſoever was congruous and ſpiritous, for its proper food, and enjoy'd it: in the mean time, it did depreſs all the morbific particles, into the ſpinal marrow, by which the involuntary motions of the members were excited, after that manner as we ſaid but now.

The Curatory Method Obſerved in this caſe.

Being requeſted to undertake the cure of this worthy Virgin; firſt, a light preparation of her body being made, I gave her a ſolutive potion of the infuſion of *Senna* and *Rhubarb*, with *yellow Sanders* and *ſalt of Wormwood* added to it, by which ſhe was purged twelve times with great eaſe; the next day I took eight Ounces of blood from her left Arm, every evening I gave her an opiate of the water, and Syrrop of the *flowers of Lungwort*, with the *powder of Pearls*: beſides, once within ſix hours, I preſcribed her to take a doſe of the *ſpirits of Harts-horn*, in a draught of the following Julup: Take of the *waters of black-Cherries, Walnuts*, and the *flowers of Pæony*, each three Ounces, of the Antipeleptic of *Langius* two Ounces, of the *Syrrop of the flowers of the Male-Pæony* two ounces, of the *powder of Pearls* one Scruple, mix it, and make a Julup: becauſe ſhe could not endure much purging, *Cliſters* with Sugar'd milk were made uſe of frequently: beſides antiſpaſmodic Ointments being applied to the hinder part of her neck, and the back-bone, we ordered often rubbing of the diſtempered members, with warm Wollen cloths wetted in proper Oil.

By the uſe of theſe the ſick perſon within ſix days ſeemed to be very much helped; for the Convulſive motions almoſt wholly ceaſed, and ſhe could contain her members quietly in their due poſition, only her head ſometimes by a lighter contraction was compelled to bend gently this way and that way; further ſhe was able to ſtand a little, and riſe out of her Chair; but when ſhe went to ſtep forward, ſhe went not rightly, but obliquely on one ſide: At this time going away, I left her much better, and in a manifeſt ſtate of growing well: But after another week, when the North-wind being high, and ariſen in night-time, the Window not being faſt ſhut, blew very much upon the ſick perſon being in Bed, ſhe preſently taking cold, relapſed into that kind of condition, that ſhe became obnoxious not only to Convulſive paſſions, but to an uniuerſal periodical Palſie: for after that ſhe was forced to move about, turn, and wind variouſly, all her Limbs ſucceſſively, with her head, and members by turns, bent, and thrown about here and there (as before) from morning to night; till at night theſe kind of motions wholly ceaſing, a reſolution of her members, or palſie ſucceeded, ſo that ſhe was not able to ſtir either hand or foot, or any other part of her body beſides, or to exerciſe any motive bending of the body, lying in her bed almoſt immovable like a ſtone; but being a little refreſhed with ſleep, about morning, as ſhe recovered ſome little ſtrength or virtue of the regular motive faculty, by bending, tho but weakly here and there, her arms, and legs, ſo alſo the involuntary and convulſive motions did conſtantly return, enduring from that time all the day, which again at the evening were changed into theſe reſolutions of the Limbs.

By theſe it appears clearly, that the ſick Gentlewoman laboured with a twofold Diſeaſe, *viz.* a Palſie, and Convulſion, and that the material cauſe of either, was ſomewhat diſtinct: For it ſeems, that the animal ſpirits every where abounding, being burdened with narcotick particles, were almoſt continually bound: beſides that, in the time of ſleeping, together with the nervous juice, the Convulſive particles plentifully flowing in, clove alſo to the ſpirits: for the exploſions of which, the ſpirits being incited, produced the involuntary motions: but alſo at that time, the narcotic *Copula* being ſomewhat ſhaken off, they were then able in ſome ſort to perform the voluntary or regular alſo: Beſides the Remedies but now recited, they did carefully adminiſter very many others, almoſt of every kind, *viz.* Antiſcorbuticks, Antiparaleticks, Decoctions, Sudorificks, or ſweating Medicines, diſtilled Waters, Spirits, Elixirs, Tincture, Baths, Liniments,

Liniments, with many others; by the use of which, the symptoms were something remitted, but yet the Disease was not wholly cured, the universal Palsie soon ceased, that she was able at any time to move her Limbs, and to bend them here and there; and also the involuntary motions did trouble her but rarely, yet she continued languishing and weak; and when she being of a more fine temper, and prone to a Consumption, by reason transpiration was hindred, the recrements of the bloods being laid up in the Lungs, brought in a Cough, which every day growing worse, she at length died of a *Phthisis* or wasting.

2. *Observation.* Some years since, I was sent for to a Noble Virgin, sick almost after the same manner, and sometimes worse: For this suffer'd almost perpetually, coming by turns, involuntary motions, to wit, shakings of the head and members, or deflections or movings about here and there: besides, she was afflicted with an exceeding troublesome and plainly wonderful Convulsion of the *Diaphragma* and muscles serving for breathing: for every minute of an hour, and oftner, her back bone was suddenly bent in about its middle, and together her breast shooting out forward, and her *hypochondria* being drawn inwards, she made a noisie sobbing, now double, now threefold, but still with a less and less noise: this kind of motion, and ebbing of a crashing noise, was wont to come for many hours, and so that she might be heard through the whole house; and when any short interval of this hapned, she was compelled presently to shake, or writhe together extreamly her arms and hands, and sometimes her legs and feet, and also to fling about most furiously her head, and by and by to hold her neck, as it were stiff, and immovoble: and then in speaking, her tongue would be taken after that manner that she would repeat the same word very often, yea sometimes twenty times at least: when the Convulsive motions tormented her strongly in her outward members, she was free for a little while from that throatling and noisie Distemper; and this space of intermission she called her time of ease; tho in the mean time her head and members were carried violently here and there, with Convulsive motions: if at any time she lay on her left side, presently a contraction of her right *hypochondrium* inwards, with a sobbing or throatling, vexed her. Within a few day, her strength being very much lost by the assiduity of the passions, she contracted so great an imbecility in her loins and joynts of her legs, that she could not stand, nor lean on her feet: her stomach, distempered either with weakness or the convulsion, returned back whatever was put into it, by vomit.

The nature and cause of the described case. In this case, as in the former, it appears clearly, that the animal spirits, not only those implanted in this or that part or region, had contracted an heterogeneous *Copula* to be shaken off by some turns, but also the spirits influencing some nerves, being imbued with explosive particles, had brought in the perpetual and wandring Convulsive motions. And when at first it hapned that the spirits so afflicted did assault not all the nerves together, nor any indifferently, but for the most part only those belonging to the *Diaphragma*, and the *Appendixes* of the spinal marrow, so that within those spaces the fury of the spirits, perpetually exploding, was limitted; for this reason it hapned that the Convulsive affections being restrained in any one of those parts, did break forth more furiously straight in another; and when by their proper instinct, their motive force was implyoed in one region, the same was in the mean time wont to be remitted in another. Moreover, in this sick person, the morbific matter consisting both of narcotick and convulsive particles, caused together the paralitick and convulsive Distemper.

Coming to her on the fourth day, I gave her an Emetick potion, by which she vomited seven times abundance of ropy phlegm, with yellow choller, yet without any ease: on the next day I took six Ounces of blood from her left Arm, presently from thence the blood being more impetuously carried towards the head, she complained mightily of an headach, and giddiness; But within three days, she being let blood in the foot, found her self better: she afterwards took Remedies for the Distempers of the nerves, to wit, *spirits of Harts-horn*, and of *Blood*, *Bezoartick* and *shelly Powders*, *Julups*, and *Electuaries*, Antispasmodical: by the use of these the symptoms seemed to be something remitted, but yet they remained somewhat after the manner but now described: After a fortnight, by the prescription of a certain Country-Woman, she took in a draught of Beer, six spoonfuls of *blood* taken from the ear of an Asse, by which she seem'd on a sudden to be cured: for forthwith all the Convulsive motions did leave, and she remained free from them 24 hours; but yet the Disease returning the next day, with its wonted fierceness, would not give place neither to that Remedy, nor indeed easily to any others: she therefore for the future, took Medicines methodically prescribed: Once within six days she was gently purged, besides she took the Powder composed of *Bezoar*, *Pearls*, and *Coral*, with the roots and seeds of *Pæony*, also an Electuary,

ctuary, preſcribed by *Horſtius* for theſe kind of admirable Convulſions; alſo *Julup*, and *decoctions*, proper in convulſive Diſtempers: *Cliſters* were often uſed, frictious ointments, and veſicatories were adminiſtred with ſucceſs: within another week the ſobbing affection wholly ceaſed, and likewiſe the other Convulſive motions being grown more gentle by degrees, very much remitted: growing well of theſe Diſtempers, a *Cathar* falling down in her throat, ſhe was ſo much troubled, that ſhe almoſt continually ſpit forth a ſharp, and as it were corroſive ſpittle, as if ſhe had had a ſalivation by taking *Mercury*: which kind of Remedy, indeed, hath been found to have been the laſt event in this caſe: but I wholly abſtained from adminiſtring it, becauſe both the ſick, and her friends, would not give me leave.

After this plentiful and troubleſome ſpitting had continued for many days, the Diſeaſe ſeem'd almoſt to be wholly cured: ſo that this noble Gentlewoman being free of her Convulſive motions, went abroad, and was well, both in ſtrength and ſtomach. Only ſhe complained, that oftentimes in a day, ſhe was ſuddenly afflicted for about a minute of an hour with a ſhivering of her whole body; which kind of Diſtemper coming upon her ſometimes in the night, broke her ſleep: within the ſpace of a month this ſymptom alſo, and likewiſe her Catarrh wholly ceaſed: But from thence ſhe was ſometimes afflicted with an extream ſourneſs in her ventricle, and the paſſage of the *Oeſophagus*, and ſometimes alſo in her mouth, and pallate, that it was feared leſt the inward skin being fretted, thoſe parts ſhould contract an ulcerous diſpoſition; beſides ſhe was wont to be tormented often in her ſleep, ſometimes alſo being awake, with the night-mare or *Incubus*. For this I preſcribed *ſpring* and *fall*, a gentle purge to be adminiſtred, with the uſe of antiſcorbutick Remedies, and ſometimes *Chalibiates*, or Medicines of *prepared ſteel*, which kind of method ſhe obſerved ſo much to her benefit, that ſhe was well in health for many years, and is as yet well.

Among the many Remedies which were taken againſt that ſourneſs, and as it were ulcerous diſpoſition of the pallat and *Oeſophagus*, I preſcribed that ſhe ſhould drink every morning her own Urine freſh made; this, whilſt it was very ſaltiſh, was wont to give her great eaſe; but at ſometimes her Urine flow'd from her thin and plentifully, which being nothing ſalt, but like to ſour Vinegar, from the drinking of that ſhe received little or no benefit.

The reaſon of the caſe but now deſcribed, ſeems not much unlike the former, unleſs that in this ſick Gentlewoman the exploſive particles had entered into more paſſages of the nerves, to wit, beſides the *appendixes* of the ſpinal marrow, into thoſe dedicated for the office of breathing, and alſo by fits, into thoſe deſigned for the motion of the Tongue, and almoſt perpetually tormented the ſpirits, abounding in them with rage or fury.

But that the cure of this Diſeaſe happen'd by the falling down of the ſharp humor into the emunctories of the mouth and throat, we may from thence gather that the material cauſe of this, was the heterogeneous particles, and as it were nitrous, begotten in the blood; which, when from thence, being paſſed thorow from the brain, they were carried into the nervous ſtock, cauſed the aforeſaid Diſtempers: But aſſoon as by the help of Remedies the more plentiful proviſion of that matter was hindered, and the morbific particles already produced both from the blood, and the brain, and nervous ſtock, were derived into thoſe emunctories of the head, the Convulſive Diſtemper preſently ceaſed, and within a ſhort time, ſuch a Criſis or Secretion ſtill remaining, the perfect cure of the Diſeaſe followed.

Foraſmuch as the Urine being of it ſelf very ſalt, and as it were lixivial, became at ſome times ſouriſh, which did not give any help, as the former, to the ſourneſs of the throat: it may hence be gathered, that the ſalt particles of the blood and humors coming away by the Urine, had a twofold ſtate or condition, to wit, of fixedneſs and fluedneſs; wherefore the Serum, imbued by them, became now of this, now of that nature: for it ſeems, that the Saline particles being degenerate within the maſs of the blood, remained fixed, and rendred the Urine for the moſt part Lixivial: but thoſe which flowed without the blood in the nervous juice, or were laid up about the ſolid parts, did degenerate into a flux or acetouſneſs: and therefore from theſe, being derived into the emunctuaries of the mouth, that noted ſourneſs of the mouth, and *Oeſophagus* proceeded: moreover, when theſe kind of particles being gathered to a fulneſs in the nervous juice and ſolid parts, did ſwell up, and ariſing to a fluxion, boiled up into the blood: preſently theſe being ſent away from thence in heaps, thorow the Reins, rendred the Urine increaſed in quantity, ſouriſh. But foraſmuch, as the Saline particles, being of a divers condition, and that thoſe of the ſame kind could not be mingled together, they mutually moved againſt one another, and break their forces; therefore the ſalt Urine, and not the ſour, healed the ſourneſs of the throat. It appears

pears by a vulgar experiment, that the moſt ſharp *ſpirit of Vitriol*, by the mixture of the *Salt of Tartar*, or any other Lixivial, grows very mild: yea, and yet from thence appears, that the acid humor ſweating out into the parts of the mouth and throat of this Gentlewoman, came near the nature of ſharp *Vitriol*; becauſe the fume of Tobacco, being taken at the mouth of the ſick perſon, was wonderfully ſweet, as it happens to ſuch who have beforehand taſted *Vitriol*.

Becauſe we treat here of admirable Convulſions, which do not ordinarily happen, and whoſe nature and cauſes lie deeply hid; for the better illuſtration of theſe kind of Diſtempers we will yet ſhew one or two more caſes no leſs wonderful than the former.

3. *Obſervation.* About ten years ſince, I viſited the daughter of a certain Noble man, troubled after that manner with Convulſive motions, that ſome thought her poſſeſſed with an evil ſpirit: This virgin about ſixteen years of age, fair, and well-made, yet begotten of a paralitick Father, without any evident cauſe, about the Winter-ſolſtice began to fall ill. At firſt ſhe was troubled, though not in any grievous manner, with an head-ach, and giddineſs for many days; then ſhe felt, now in one of her arms, and then in another, a trembling and ſudden contraction; which kind of Convulſions returning often that day, endured ſcarce a moment; the next day ſitting nigh her Siſter in a Chair, ſuddenly leaping out, ſhe fetch'd one or two jumps, and many others ſucceſſively, with wonderful agility, at the diſtance of many feet; then, when ſhe was come to the farther part of the Chamber, ſhe ſtood leaping a great while in the ſame place, and every time to a great height; when her legs were quite tired with leaping, ſhe fell on the floor, and preſently ſhe flung her head here and there with wonderful violence, as if ſhe would ſhake it from her neck: As ſoon as ſhe ceaſed from this motion for wearineſs, preſently the ſame fury invaded her hands and feet, ſo that ſhe was forced ſtrongly to exerciſe theſe members, by ſtriking the walls or poſts, or by beating the pavement: when by reaſon of ſhame or modeſty, due to her friends, and by-ſtanders, ſhe did hinder her ſelf with great violence from theſe motions (for all the while ſhe was her ſelf, and ſpake ſoberly) the Diſtemper being ſent inwardly, ſhe was very much infeſted with a mighty oppreſſion of the heart, with a bemoaning and very noiſeful ſobbing; when ſhe would eaſe her ſelf, ſhe was forced preſently, the fury being tranſmitted to the muſcles of the outward Limbs, either to leap about, or to fling here and there cruelly her head, or arms, or alſo to run about the Chamber moſt ſwiftly, or to beat the ground with her feet: becauſe theſe kind of vehement motions of her Limbs or *Viſcera*, in the Tragedy of the Diſtemper, did mutually relieve themſelves, returning as it were in a round.

The Curatory Method. Coming the 5th day after this Lady had been ſick, I gave her a Vomit of the fuſion of *Crocus Metallorum*, *wine of Squills*, and *ſalt of Vitriol*, by which ſhe vomited ſeven times cancker'd oil or choller in a great plenty, with the mixture of a ſharp, and as it were vitriolic humor: The next day ten Ounces of blood was taken from the *Saphana* vein; beſides, ſhe took twice in day, Antidotes of the *powders* of precious Stones, of *human Skull*, and the *root of the Male-Pæony*. By the uſe of theſe, within a week, ſhe ſeem'd to be cured; ſhe continued for many days afterwards free from the aforeſaid Diſtempers: But after two weeks, at the time of the full Moon, ſhe fell into a relapſe of the ſame Diſeaſe more cruel than before; for beſides thoſe wonderful leapings, and vehement converſions and roulings about of her head and members, ſhe was forced beſides to fetch often a moſt rapid courſe round about the Chamber: ſhe began at this time, from the Preſcripts of others, to take anti-hyſterical Remedies, and Purges at certain ſet intervals, but without any help: At laſt, I being ſent for, becauſe ſhe ſeemed indued with a ſtrong habit of body, and with a notable fierceneſs of ſpirits, I gave her a ſtronger Emetick, by which ſhe vomited forth ten times, greeniſh choller, like to ruſt, with phlegm, ſharp like ſtygian water, and ſhe was ſuddenly eaſed: After this, I gave her every morning a draught of white-wine, dilated with the *water of black-Cherries*, with ſows or hog-lice bruiſed and infuſed therein, and ſtrongly preſſed forth. By the uſe of theſe, ſhe ſeem'd preſently to be cured, and was well above a Month: And when afterwards, the Diſtempers being about to return, ſhe felt at any time ſome fore-runners, preſently by the uſe of a Vomit, and the expreſſion of the *Millepedes* or *Cheſlogs*, ſhe averted the approach of the Diſeaſe: within three months, ſhe ſo far recovered her former health, that ſhe has now liv'd for many years free from thoſe kind of Convulſive Diſtempers: But from the time the Convulſive paſſions wholly ceaſed, ſhe was ſometimes troubled about the parts of her mouth, and throat, with a defluxion of a moſt ſour humor, like the vitriolick *Stagma*; beſides, ſometimes ſhe was obnoxious to the *Pica* or longing of Women, and at ſometimes alſo to the Cough, with a diſcoloured ſpittle, threatning a Conſumption,

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notwithſtanding which, by Remedies uſed in theſe kind of Caſes, ſhe was eaſily cured.

As to the Ætiologie, or rational account of the aforeſaid caſe, there is no reaſon that we ſhould fear to refer both the Cauſes and Symptoms of this Diſeaſe, to the exploſive Particles (the Brain being paſs'd thorow without hurt) ſent as a ſupply continually from the Blood into the Nervous Stock; which, foraſmuch as they being poured forth in great plenty, were not reſtrained within private Mines, to be ſtruck off onely by turns, cleaving every where, both to the implanted and flowing Spirits, forced them, as it were inſpired with a Madneſs, to be perpetually exploded, and to grow raging here and there, by bands: ſo that indeed, they were not able at all to be ruled, within the containing parts; but there was need to overthrow, and to tame them; impetuouſly tumultuating, and apt to be carried here and there, like a Whirlwind, by ſome very violent and ſtrong exerciſe. In truth, it was in this ſick perſon, as it is in muſical Organs, which if filled above meaſure, by too great a blaſt of wind, unleſs preſently the paſſage of more Pipes be opened, the whole frame of the Organ is quickly ſhaken, and in danger to be broken to pieces: In like manner in this Lady, when the Animal Spirits actuating the pipes, and the depending *Fibres* of ſome of the Nerves, were moved beyond their due Tenour, there was a neceſſity that their force ſhould be beſtowed on many vehement local Motions together, whilſt they inflated above meaſure the Nervous Bodies: wherefore, when their Madneſs was hindred in one part, by and by, like Wind pent up, creeping ſomewhere elſe, it broke forth more violently in ſome other part. *The reaſons of aforeſaid caſe.*

In this ſick Perſon, the uſe of one or two Vomits, brought help once or twice, becauſe that by it, what was lodged in the gallie-Veſſel; yea the *Glandula's* and *Emunctuaries*, and alſo about the *Viſcera* of Concoction, being by this means emptied, the purging of the Blood and Nervous Juice, were more copiouſly drawn into the ſame place; therefore indeed, that the Animal Spirits flowing within the Pipes of the diſtempered Nerves, might be leſs infected by them: By this reaſon alſo, the juice of the Sows, or Hog-lice, was beneficial; foraſmuch as it derived the Morbifick Matter, from the Nervous kind to the Urinary paſſages: Beſides theſe Remedies, the Root, and in a great part the Branches of the Morbifick Matter being cut off, and when others, as it were antidotes, and as it were carefully Adminiſtred whatſoever was left of it; Nature at length becoming ſuperior (as ſhe is wont in theſe critical caſes) ſent away to the ſinks of the Mouth and Throat.

Whilſt I was writing theſe things, I viſited an illuſtrious Virgin, who was troubled with other kind of Convulſive motions, and thoſe univerſal, and no leſs to be admired: ſhe was about Eighteen years of Age, handſome, and well made, and before this time, healthful; when the Peſtilence raging in this Neighbourhood, ſhe had come within the danger of its Contagion, ſhe fell into a panick fear, with frequent ſwouning; the Night following, ſhe ſuffer'd ſo great a *deliquium*, or ſinking down of her Spirits, and Inſenſibility, that ſhe ſeem'd juſt a dying; hardly ſtrugling with ſo great an evil: afterwards, ſhe had every day Convulſive fits, though at firſt, at uncertain hours, and returning after a manifold kind; But within a ſhort time, its comings being made regular, twice in a day; to wit. they conſtantly returned at Eleven of the Clock, and before Five in the Afternoon, that no intermitting Fever kept more exactly its periods; yea, alſo the ſame accidents of the fit daily chanced after the ſame manner. 4. *Obſervation.*

When ſhe had thus been ſick for three Weeks, one day I was ſent for, that I might take notice of all the Symptoms, and the whole figure of the Diſeaſe; ſhe being up about Ten in the Morning, was well in her countenance, going, and ſpeech; ſhe behaved her ſelf exceeding well, ſo that none would ever ſuſpect her to be ſick: at Eleven of the Clock, ſhe began to complain of a fullneſs of her Head, and numbneſs of Spirits, with a light ſwimming; by and by ſhe felt a great Pulſation, and as it were the leaping of ſome live Animal in her left *Hypochondrium:* putting my hand on her ſide, I plainly perceived this Motion; then a ſtretching, and belching followed; which done, ſhe was preſently put to bed, and a Maid ſitting upon a Pillow held her down; who during the fit, moſt ſtrictly graſpt the ſick Perſon, holding her to her boſom, with her arms folded about her waſt: beſides, ſervants were ready, and her Relations ſtanding by, who now preſs'd down her Belly, and *Hypochondria* riſing up, and ſwelling to a great bulk, now held her hands and arms. The chief Symptoms of the Diſeaſe, which being excited by turns, almoſt divided the whole fit, were theſe two, *viz.* One while cruel Convulſions of the Bowels did infeſt her, ſo that the *Abdomen* riſing up into a mighty bulk, ſtrove againſt the hands of the by-ſtanders, held upon it, that it could not be preſſed down; and at the ſame time, her *Præcordia* being contracted upwards, the motions of her blood and heart were almoſt ſtop't: in which ſpace of time, this Virgin, her Head falling down, with a ſmall pulſe, and almoſt without voice, lay nigh

ſenſleſs; after two or three minutes of an hour, theſe Convulſions ceaſed: and then the ſick perſon ſetting her ſelf upright, look'd about chearfully, and for a while the force of the Diſeaſe changed into talking, and ſinging; both of which, ſhe without ceaſing performed moſt pleaſantly, and moſt elegantly, beyond her proper capacity: with theſe kind of ſpeeches, and pleaſant jeſts, ſhe fell upon all the ſtanders by, that nothing in a Comedy could be more pleaſant; then ſhe uttered moſt ſweet tunes of Muſick, and more pleaſant than any other could, or her ſelf at any other time: After ſhe had paſt ſix or ſeven minutes of an hour, thus jeſting and ſinging, the Convulſions of her Bowels and *Præcordia*, and the want of ſpeech, came upon her as before: and theſe ſoon remitting, the force of the Spirits leaping back from the inferior Nerves on the Brain, it was laſtly imployed in the pleaſantneſs of Speech, and Songs; as often (when ſhe talkt to the by-ſtanders) as any of them replyed any thing bitterly, or reproachfully, ſhe fell into thoſe moſt grievous, and longer continuing Convulſions of the *Viſcera*. After this manner ſhe was wont to be moleſted with an alternate Diſtemper of the Bowels, and Brain, about the ſpace of an hour; then towards the end of the *Viſcera*, the fit declining, more light Convulſions being made, they repeated three or four times, without any intermiſſion; then theſe wholly ceaſing, the force of the Diſeaſe brake forth into her outward Members, from whence it quickly vaniſhed; for her Arms and Legs, for a minute of an hour, ſuffered leapings forth, and contractions; preſently after, the ſick perſon being taken up, left her Bed, free from all Convulſions, till a new fit returned; yea, indifferently well in ſtrength ſhe walk'd about the Houſe, and during the interval of her Diſtemper, ſhe chearfully performed the accuſtomed Offices of Life, excepting that her Stomach-languiſhings, all day ſhe loathed food; in the evening, after the ſecond fit, ſhe ſupp'd moderately.

This was the preſent ſtate of the Diſeaſe, in whoſe fits, the more clear uſe of ſome faculties, ſeem'd in a manner to compenſate the irregularity of others: But about the beginning of her ſickneſs, it was ſomewhat otherwiſe; for the Convulſions of her Bowels were far more grievous, and an inſenſibility was joyned to them; beſides, in their interval, talking idly, an incongruous ſinging; yea, both laughter and weeping, without any known reaſon breaking forth, were wont to follow one another; but now the Animal Spirits being forced into longer Exploſions, performed them ſo regularly, now this, now that, as a more commodious way was made, that they ſeemed after a manner to be done by the command of the Will, and of Reaſon.

The reaſons of the aforeſaid Diſtemper.

That we may therefore, according to our *Hypotheſis*, frame an *Ætiology* or Rational Account of this Diſtemper: In the firſt place it ſeems, that a vehement fear did drive the Spirits inhabiting the Brain and *Præcordia*, into great diſorders: ſo that they being diſturb'd out of their ranks, both the kind of Madneſs or Fooliſhneſs, and the frequent ſwooning ſucceeded: Further, it may be ſuſpected, that from the ſame impreſſion the hurt was carried to the Brain it ſelf, ſo that its conformation being ſomewhat vitiated, the Heterogeneous and Morbific Particles were admitted, together with the Nervous Juice: then, although the ſpirits at the beginning, being confuſed and troubled, after their ſhort inordinations, at laſt recovered themſelves, and performed the wonted offices both of the animal and vital Function; yet by reaſon of the taint, impreſſed on the Brain, the Heterogeneous Particles being conſtantly admitted, cleaving to thoſe Spirits, induced exploſive endeavours, as ſoon as the ſpirits were filled to a plentitude with the extraneous *Copula*, they being irritated, entred into Convulſive exploſions for the ſhaking, or ſtriking it off.

About the beginning of the Diſeaſe, when both the diſpoſition of the Brain, and the Spirits inhabiting it, was more perverſe and vitious from the freſh received hurt, a fullneſs of the Heterogeneous *Copula* ſooner happened, and ſo its exploſion following more often, and more inordinately, was diſpatched with greater Tumult; but afterwards, when the hurt of the Animal Regiment abating, the ſupplements of that *Copula*, even as the Nervous Liquor, were daily brought in with an equal dimention, the exploſions of the Spirits being made regular and more mild, obſerved their juſt periods or ſet times.

That ſhe felt upon the approach of the Fit a fullneſs, and as it were an Inflation in her Head, with an heavineſs, and dullneſs of the Spirits; the reaſon is, becauſe at this time, the Spirits Inhabiting the Brain, being now prepared for Exploſions, were wont firſt of all to be moved, and as it were to ſwell up; then that Pulſation in her left *Hypochondria* ſucceeded; for that the Spirits inhabiting the Nervous foldings and *Fibres*, thickly planted about the Spleen, began to be Exploded: afterwards, when the Spirits flowing, both within the Meſenterick and Cardiac Enfoldings were Exploded together, thoſe elevations, and as it were leapings up of the *Abdomen*, and *Thorax*, were induced: and when in this Diſtemper the Motions

tions of the Blood and Heart were almoſt wholly ſtopped, therefore there was a ſmall, and almoſt no Pulſe, and ſhe became ſpeechleſs, and in a manner ſenſleſs.

The Convulſion of the *Viſcera* and *Præcordia* remitting, a Prattling and Singing ſucceeded; becauſe a falling down, or removal of the Spirits as yet exploded, being made from the Nervous Stock into the Brain, it changed the Convulſions into an exaltation of the fancy, and more ready exerciſe of the Phantaſm, or Repreſentation of the Imagination: So long as the Spirits within the middle of the Brain, are regularly and orderly Exploded, they bring forth the Acts of the Habits and Faculties ſo much more noble, and as it were above the ſtrength and tenour of Nature, as in this ſick Gentlewoman: but on the contrary, when the Exploſions of the Spirits in that Region happen to be inordinate, they cauſe for the moſt part fooliſhneſs; or at leaſt, the exerciſe of their powers are incongruous and abſurd.

The Convulſions of the Bowels, and the phantaſtick Actions, reliev'd one another mutually, and by turns; becauſe plenty of Spirits being diſpoſed to be ſtruck off, made their tendency, as it were, with a direct and reflected waving or undulation, now on this part, now on that, by turns: then laſtly, when they were almoſt all Exploded, the more often Convulſions of the *Viſcera* were ſtir'd up; and when a ſmall handful onely remained to be Exploded, that being at laſt excluded both from the Head and Bowels, it ran forth into the ſpinal Marrow, and employed the laſt aſſault of the Diſeaſe in the Convulſions of the Arms and Legs.

There yet remains one great difficulty in this Caſe, why the Fits of this Diſeaſe were always repeated exactly at ſet hours, and yet had ſo unequal Periods; to wit, that the coming of the firſt, was onely but ſix hours before the ſecond; and then the return of the next, did not happen but in Eighteen hours ſpace. For the ſolving of this, it is to be ſuppoſed, that theſe Fits did depend upon the Nervous Juice being ſtuffed to a Plenitude with Heterogeneous Particles; which Particles were altogether conveyed thither from the bloody Maſs, and the blood did drink up the ſame from the nouriſhing juice, ſent as a ſupply from the Bowels: Theſe being thus ſuppoſed, we muſt conſider, in what ſpace of time the Bloody Maſs is filled with thoſe Morbific Particles, and then in what meaſure it pours them forth into the Nervous Liquor. As to theſe, that it may the better appear, after what manner it was done in the caſe of this ſick Perſon, you muſt know, that ſhe took in Twenty four hours ſpace onely at one time a full Meal: to wit, after the ſecond Fit was ended ſhe Supped moderately about Seven of the Clock; the reſt of the day wanting an Appetite, ſhe hardly took any Food: therefore it is probable, that the Morbific Matter was poured forth, together with the Nutricious Proviſion, into the Bloody Maſs; chiefly in the Night time, and that more plentifully, than that all could preſently be derived into the Nervous Liquor: The Heterogeneous Particles which are firſt conveyed from the Blood, newly ſatisfied, into the Nervous Liquor, being heaped up to the fulneſs, did excite the firſt Fit, the coming of which therefore was longer delayed, becauſe both one ſpace is required wherein the Blood, and then another, wherein the Brain and Nerves are to be filled: after this Fit was over, becauſe the Blood yet full, containing in it ſelf more Particles of the ſame kind, pours them ſuddenly on the Nervous Juice, therefore the other Fit is induced within thrice the ſpace of the former: but this being ended, becauſe both the Bloody Maſs, and the Nervous Juice, are wholly freed from their burthen, the ſick Perſon finding her ſelf better than at any other time, took her food greedily enough; but after that when to the next following Fit, firſt the Bloody Maſs, and then the Nervous Juice ought to be filled with the Morbific Matter, therefore Ten hours are required for this double task; but foraſmuch as there is onely need for the ſecond Fit, that the other Particles ſhould be derived from the Bloody Maſs yet full, into the Nervous juice, therefore for this Effect, a much leſs ſpace doth ſuffice, *viz.* of Six hours,

The Curatory Method.

After I had ſeen this Lady, who had laboured for many Weeks with theſe kind of Periodical Fits, I order'd, that Three hours before the ſecond Fit, Ten Ounces of Blood ſhould be taken out of the Vein on the Foot; which being done, the coming of the Fit in the Evening being expected, quite left her, neither did it return at all afterwards; but the other Fit obſerving its former time, daily returned till the Patient being let Blood a little before its coming, remained that day free from the Diſeaſe, which however returning the day after, according to the ſame manner, exerciſed her for many Months: In the mean time, becauſe the cold of the Winter was very great, ſhe forbore for ſome time the uſe of Remedies: but the Spring coming on, this honourable Lady being brought to *Oxford*, was Cured by the following Method.

First I gave her this Cathartick, and I took care, that it was repeated every sixth or seventh day. Take of the *Sulphur of Antimony* six grains, of *Mercurius dulcis* one scruple, of the *Resine of Julup* gr. iv. of *Ginger* gr. vi. let them be beaten together in a morter, then add of the *Conserves of Violets* i. dram, make a *Bolus:* It was wont to provoke two or three Vomits, and three or four stools. The flux of her Terms came constantly in great abundance, at the set times: wherefore, when the blood seem'd very plentiful, and hot, I order'd *Phlebotomy* twice or thrice in the midst betwixt the times of her Terms: Besides, every day that she did not Purge, she took twice in a day 4 Pills of the following mass, drinking after them a little draught of the Julup below prescribed. Take of the *Roots of the Male-Pæony* half an Ounce, of *Virginian Snakeweed*, *Contraerva*, *Cretic*, *Dittany*, each two Drams, of *human skull* prepared, one Dram and a half, of an *Elks claw* one Dram, of *red Coral* prepared, of the *Powder of Pearls*, each one Dram, of the *salt of Wormwood* two Drams, of the *salt of Corral* one Dram, with what will suffice of the *Syrrop of the flowers* of the *Male-Pæony*, make a mass.

Take of the water of the *flowers* of the *Male-Pæony*, of *black-Cherries*, and of *Wall-nuts*, each four Ounces, of the Antiepileptic of *Langius* two Ounces, of the *Syrrop* of the *flowers of Pæony* an Ounce and a half, of *Castor* tied in a knot, and hung in the glass, one Dram, mix them, and make a Julup.

When she began to loath the Pills, they being omitted, she took twice a day, to wit, in the Morning and the Evening, about one Scruple of the following Powder, in a spoonful of Julup, drinking after it four or five spoonfuls of the same. Take of *Bezar-stone*, of either *white Amber*, of *Pearls* prepared, of *red Corral*, each one Scruple, of *human skull* two Scruples, of the root of *Virginian Snakeweed*, and the *Seeds* of *Rue*, each half a Dram, mingle them, and make a Powder, let her take one Scruple Morning and Evening, with a Dose of the above-prescribed Julup.

Then, when also this Medicine began to be tedious to her, she used the Pills, or the *Elixir proprietatis*, and also, sometimes for many days, the *spirits of Harts-horn:* At last, she began to be helped by that Powder, being daily taken, for some space.

In the mean time, whilst this method of healing was ordained, her hair being shaven from her head, it was covered only with a thin covering: she wore upon her Belly an Hysterical Plaister mixed with *Galbanum:* for her ordinary drink, she took a *Bochet* of *Sarsa* and *China*, the *roots* of the *Male-Pæony*, and other proper things, infused in *Spring-water* and boiled. Within a month the fits were something remitted: then, being by degrees made gentler and lesser, at length they almost quite ceased: unless that at the time of her Terms, one or two fits of the Disease was wont to trouble her: Further she labour'd with an almost constant giddiness, and queasiness of stomach; in the middle of the Summer she drank *Astrop-waters* for a fortnight, and was perfectly well.

But as for the means in general, to be shown for the Cure of these admirable Convulsions, it will not be easie to assign, either fit Remedies for this Herculean Disease, or a certain method of Cure, approved by often experience: for besides, that these like cases are seldom met with; it is likewise observed, that the same Medicines which at this time were helpful to this sick person, being given to another, or to the same, helpt nothing at another time: The reason of which seems to be, because the cause of the Disease consists in the discrasie, or evil disposition of the nervous juice, which Liquor is not always perverted after one and the same manner: But by the manifold combination of the Salts and Sulphurs, it gets a morbid nature of a various manner and kind, and oftentimes changes it: wherefore, in the most grievous Distempers of this kind, not the vulgar Medicines, taken from the Shops or Dispensatory, are to be prescribed, but magistrals, as cause arises, according to the appearances of the admirable symptoms. A gentle Vomit, Purge, Blood-letting, ought in the first place to be ordained, and to be repeated, as often as shall seem fit. As to specifick Medicines also, and appropriate in these cases, when the chief Indication shall be, to mend the temper of the Nervous juice, you may try many, and by their effect judge of their virtues: Therefore it may be lawful to try what the Remedies indued with a Volatile or Armoniac Salt may effect. For this end, the spirits and salts of Harts-horn, Blood, Soot, and the Flowers and spirits of *Sal-Armoniac*, are taken: These helping nothing, you must come to Chalybiats or Steel Medicines; the tinctures and solutions of Coral and Antimony are given: which kind of Medicines are exhibited in such a dose, and form, and so often, that some alteration may be made by them, on the whole blood or nervous juice: Further, if succes shall fail in such like, you must then proceed to *Alexipharmaca*, which help against Poysons, and the maligniancy impressed on the humors, to wit, to institute from these, decoctions, and distilled waters of vegitables, powders, conserves, and other preparations: and to compound variously some with others, and

to

to administer them diversly. It is likely, that those kind of Medicines which are wont to be helpful to such as are bitten by a Viper, or a mad Dog, or that have taken Wolfs bane, or Poyson, may be useful also in the aforesaid Convulsions. It may be lawful here, according to the example of *Gregory Horstius*, in his tract of the malignant Convulsive Disease, and also of wonderful Convulsions, to prescribe magisterial Remedies in the form of a Purging Electuary, and also of a Powder, and Convulsive Antidote, and to compound them variously, partly of simple *Alexipharmicks*, or poyson resisters, and partly of *Antiepilepticks*, or things good against the falling Evil.

CHAPTER X.

Of the Passions commonly called Hysterical, or Fits of the Mother.

THE hysterical passion is of so ill fame among the Diseases belonging to Women, that like one half damn'd, it bears the faults of many other Distempers: For when at any time a sickness happens in a Womans Body, of an unusual manner, or more occult original, so that its cause lies hid, and the Curatory indication is altogether uncertain, presently we accuse the evil influence of the Womb (which for the most part is innocent) and in every unusual symptom, we declare it to be something Hysterical, and so to this scope, which oftentimes is only the subterfuge of ignorance, the medical intentions and use of Remedies are directed.

A description of the Hysterical Passion.

The Passions, which are wont to be referred to this sense or order, are found to be various and manifold; which rarely happen in divers Women, or which come wholly after the same manner: The most common, and which commonly are said to constitute the formal reason of the Hysterical Distemper, are these, *viz.* A motion in the bottom of the Belly, and an ascention of the same, as it were a certain round thing, then a belching, or a striving to Vomit, a distention, and murmur of the *Hypochondria*, with a breaking forth of blasts of wind, an unequal breathing, and very much hindred, a choaking in the throat, a *Vertigo*, an inversion, or rolling about of the eyes, oftentimes laughing, or weeping, absurd talking, sometimes want of speech, and motionless, with an obscure or no pulse, and deadish aspect, sometime Convulsive motions in the Face and Limbs, and sometimes in the whole Body, are excited: But universal Convulsions rarely happen, and not unless this Disease be in the very worst state: because, for the most part, the Tragedy of the Fit is acted without contraction of the members, only in the inferior Belly, *Thorax*, and Head, to wit, in some of them, or successively in all: Women of every age, and condition, are obnoxious to these kind of Distempers, to wit, Rich and Poor, Virgins, Wives, and Widows: I have observed those symptoms in Maids before ripe age, also in old Women after their flowers have left them; yea, sometimes the same kind of Passions infest Men; as plainly appeared by the example already shewed.

The cause of the symptoms inquired into

As to the causes of those symptoms, most ancient, and indeed modern Physitians, refer them to the ascent of the Womb, and vapours elevated from it: The former opinion, although it plead antiquity, seems the less probable, for that the body of the Womb is of so small bulk in Virgins, and Widows, and is so strictly tied by the neighbouring parts round about, that it cannot of it self be moved, or ascend from its place; nor could its motion be felt, if there were any: as to that vulgar opinion, or reason taken from the vapours, we have often rejected it as wholly vain, and light, for just reasons elsewhere: But we judg, the Passions but now described, do neither always, nor at all proceed from the ascent or the vapours of the Womb: and that indeed, other very famous Physitians have already determined: For in times past, *Charles Piso*, and of late the most learned *Highmore*, have vindicated the Womb from all fault; and the Passions, which are commonly call'd Hysterical, are thought by this latter to arise from the blood, most impetuously rushing on the Lungs; and by the other, from a serous colluvives heaped together near the *origin* of the Nerves. How probable this latter opinion doth seem, shall appear from what follows: But as to the opinion deliver'd by Doctor *Highmore*, concerning this thing, though it be far from our custom to contradict any ones opinion, and that it is almost unlawful for me

to dissent from this famous man: yet, because our Pathologie standing on a contrary *basis*, (viz. the cause of the Hysterical Distemper being imputed more immediately to the nervous stock, than to the blood) will seem to be only asserted, unless we shew the reasons which combat against that *hypothesis*; and for ours, therefore taking leave, here we will try more exactly either opinion, put as it were in a ballance.

Doctor Highmores *Opinion Examined.*

In the fit therefore commonly called Hysterical, this famous man supposes the blood, for that it is thin, flatulent, and with a certain effervescency, to rush too much in heaps, into the pneumonic vessels, and the vessels of the heart, and in them to broil up impetuously, and so to stuff up the Lungs, and very much to aggravate them, that neither they can exercise their motion, nor that the blood can be drained from the bosom of the heart: Hence, from the blood stagnating in the *Præcordia*, a great oppression, difficult breathing, and often none, with a melting of the vital spirits, were wont to be inferred: then the *diaphragma*, that it might give place to the Lungs, more and more distended; and that breathing at least might be some way made, is carried downward, with a mighty and long continued *Diastole*, and so by pressing down the Intestines, it lifts up the *abdomen*, and *hypochondria*, and feigns a motion as it were the arising of a Globe: But afterwards, the vital function labouring after this mannet, the animal faculty arises in its aid; wherefore, a necessity of motions in various parts urging the animal spirits, being driven impetuously into the beginnings of the nerves, produce divers manners of Convulsions, running here and there. The Author endeavours to confirm this Opinion, by the great help in this Disease had by taking away the bloody excretion, both from things helpful, and things hurtful in this Passion.

But though I cannot but praise this Doctrine of the suffocation of the Womb, as very ingenious and cunningly wrought; yet that I do not consent to it in all things, some reasons of great moment clearly hinder me. Truly I confess, that I do not understand, how in some Hysterical persons, to wit, who are of a more frigid temperament, and are often troubled with the Pica, and longing Disease, the blood should so immoderately boil up in the Lungs, without any conspicuous notes of its growing hot, in some other place. I have known young maids, by reason of the green sickness, as it were without blood, to wit, whose blood indeed being without life, did remain without any exercise in the heart, and was from thence difficultly enough drawn forth into the Lungs, who yet were grievously obnoxious to the Passions called Hysterical: Certainly it is not probable, that the blood of these persons growing immoderately hot, should rush impetuously into the Pneumonick vessels, and should stuff up their pores and passages very thickly, when in the mean time such become short-breath'd, by reason of the absence of the blood from the Lungs, or its difficult admission to them: Besides, by what means comes it to pass, that this violent course of the blood into the Lungs, which is supposed to be made in this Fit, brings forth no Inflamation in them? For that the blood, being too much heaped, or rapidly put into any part, is easily extravasated, and is wont to excite an Inflammation hardly to be shaken off. From whence is it therefore, in the Hysterical Distemper, the blood entring violently into the Lungs, and distending them, does not cause a peripneumonie or Impostume of the Lungs? Or wherefore the Distempers, as it were Hysterical, come not on an inflammation of the Lungs, otherwise caused? Wherefore it seems improbable, that the blood swelling up, with its proper anger or heat, should rush into the Lungs, and by stuffing them, renders them too immovable, and so secondarily and consequently induce Convulsions of the *Diaphragma*, and other parts: but it may rather seem, that by reason of the *Diaphragma*, and other organs of breathing, being first affected with a Convulsion, the blood should be forced to stagnate in the *Præcordia:* Besides, it may be observ'd, that the Lungs are not always afflicted before other parts; for oftentimes the Convulsive symptoms begin elsewhere, and not rarely bear the region of the breast wholly untouch'd: Because in some, the *Vertigo*, and Corruscations or sparklings of the eyes, begin the fit; to which succeed either weeping, or laughing, or convulsive motions of the Limbs, without any straitness of the breath, or oppression of the heart: In others, before respiration troubles them any way, a swelling in the bottom of the belly, with a vomiting and rumbling of the belly, begins and often ends the fit; so that the difficulty of breathing oftentimes follows these symptoms at a great distance, and is wont to be prevented by the tying strictly of swathing-bands about the *Hypochondria*. Moreover, it seems, that this ascent as it were of a certain round thing, from the *Hypogastrium* or lower part of the belly, can never proceed from the depression of the *Diaphragma*; because in the Hysterical fit, this part is not always pressed down towards the lower parts, but oftentimes drawn up to the higher parts, and drives the Lungs upwards, so that the spirit or breath being almost shut forth, threatens the danger of Choaking. By these, and other reasons, we are at length per-

perſwaded to that opinion, that the Diſtemper named from the Womb, is chiefly and primarily Convulſive, and chiefly depends on the brain and the nervous ſtock being affected, and whatever inordination, or irregularity from thence happens, about the motion of the blood, is only ſecondary; and is made dependingly by the Convulſions of the Bowels.

The Hyſterical Diſtemper chiefly belongs to the Brain and nervous ſtock.

But that this doth conſiſt within the bounds of the head, both the comparing of the ſymptoms, which happen in the living, and the Anatomical obſervations of the dead, clearly ſhew; becauſe we may obſerve, that this Diſtemper often takes its riſe from a ſudden fear, great ſadneſs, or anger, or other violent Paſſion, in which the ſpirits inhabiting the brain are chiefly affected beſides, to ſome an ill manner of Diet, and various accidents whereby the humors being vitiated, are headed more plentifully within the head, at firſt brings this evil. Yea, the manner of the fits clearly evinces the ſame, foraſmuch, as a fulneſs of the head, a *Vertigo*, a ſparkling of the eyes, a ringing noiſe of the ears, begin in many the Hyſterical fit, and often conclude it: Beſides I have opened ſome Women dead of other Diſeaſes, tho while they were ſick, very obnoxious to Hyſterical Paſſions; in whom the Womb being very well, I have found in the hinder part of the head, the beginnings of the nerves, moiſtned and wholly drowned with a ſharp *ſerum*, as ſhall be more largely declared anon.

Having weighed theſe, and other reaſons, we doubt not to aſſert the Paſſions commonly called Hyſterical, to ariſe moſt often, for that the animal ſpirits poſſeſſing the beginning of the Nerves within the head, are infected with ſome taint; to wit, they being either acted or brought into Confuſion, or being tincted with vitious humors, get to themſelves an heterogeneous and exploſive *Copula*, which they carry far away with themſelves, into the Channels of the Nerves: and when the ſame ſpirits are filled to a plenitude, with that *Copula*, thorow all their *ſeries* or orders, either of their own accord, or being occaſionally moved, they enter into exploſions, and ſo ſtir up Convulſive motions: But that ſuch a *Copula* adhering to the ſpirits, is chiefly derived together with them into the interior nerves; the reaſon is, becauſe in this paſſage towards the *Præcordia* and *Viſcera*, the animal ſpirits, by reaſon of the Diſtemper of the mind, are very much diſturbed: wherefore, they more eaſily admit any evils brought from another place, and more readily conceive irregularities. For the animal ſpirits, chiefly for this occaſion, contract a Convulſive diſpoſition: foraſmuch as they, from a violent impreſſion, are perverted out of their courſes, and their wonted manner of influence, and acting; hence they not only repeat their inordinations, but alſo receive the heterogeneous particles into their embraces, and more eaſily combine with them: Wherefore, foraſmuch as the animal ſpirits, running thorow the nerves of the wandring pair, and intercoſtals, are continually entangled with all perturbations both of the concupiſcible, and iraſcible Appetite, it is no wonder, if they acquire a Convulſive diſpoſition before the reſt.

The cauſe of the Diſeaſe moſt often begins about the beginnings of the nerves.

It being ſuppoſed (which indeed ought to be ſuppoſed) that the animal ſpirits have contracted an heterogeneous and exploſive *Copula*, now the nervous *origines*, and carried it together with it ſelf into the interior nerves, and ſpread it thorow all their paſſages, it will not be hard to aſſign the reaſons of the hyſterical fit, and of all its ſymptoms. For firſt of all, the Diſeaſe being ready to fall upon one, oftentimes the *Vertigo*, a rolling about the eyes, and a certain inflation of the brain, as it were previous skirmiſhing are ſtirred up, becauſe the whole band of the ſpirits, being in readineſs for exploſions, the more light companies of them leaping back towards the brain, are firſt ſtruck off; then preſently a perturbation ſucceeds in the bottom of the belly or *hypochondria*, for that the ſpirits within the enfoldings here and there, are next diſturbed: For we have elſewhere ſhown, if at any time the animal ſpirits are exploded, in a certain whole *Series*, thoſe which abode in the extream parts, firſt of all enter into that aſſertion: Wherefore the beginnings of this Diſeaſe, are found to be, for the moſt part, in the Head and Bowels: but that the Convulſions are firſt perceived, now in the bottom of the Belly, now in the *Hypochondria*, the reaſon is, becauſe the morbific matter is ſometimes carried by the paſſage of the intercoſtal nerve, into the utmoſt meſenteric enfoldings; but ſometimes the ſame, being ſlid down, not beyond the ends of the wandring pair, ſubſiſts much nearer, to wit, about the enfoldings of the ſpleen or ſtomach.

The ſame cauſe afterwards diſpoſed, thorow the whole paſſage of the Nerves.

When therefore the animal ſpirits (as hath been ſhown) within the nerves of the wandring pair, and intercoſtals, are imbued from their *origine*, even to their utmoſt ends, with an heterogeneous and exploſive *Copula*; they at length, either from meer fulneſs, or by an irritation ſomewhere made, are ſtirred up to exploſions; in which affection, if any ſpirits leap forth towards the middle of the brain, they induce the *Vertigo*, the Inflation and other prævious Accidents of the Head: but the Spirits inhabiting the other

The reaſon of the Hyſterical ſymptoms unfolded.

other Extremity of the Nervous Trunk, *viz.* the Mesenteric Enfoldings begin chiefly to be Exploded, which presently by their letting off, compel the lower parts of the *Hypogastrum* to be lifted up, and contracted upwards, and so induce the Ascention of a certain bulk, as it were of the Womb: then, when the upper parts of the Enfoldings of the Mesentory, are by degrees intangled with the same Distemper, and the Bowels annexed to the same are Elevated, and drawn forcibly towards the upper parts, the violent swelling of the *Abdomen*, as it were with a certain leaping forth, succeeds: Further, the Ventricle is not onely Elevated, by changing its place; all its *Fibers*, to wit, the Direct, Oblique, and Transverse, being affected at once with the Convulsion, is often distended like a blown Bladder: hence very often Vomiting, or at least a rumbling and murmur of the *Hypochondria*, are excited: but as soon as the Spirits being Exploded with a certain *series*, it comes to the Region of the *Thorax*, the *Diaphragma* being drawn together, with an huge Diastole is sometimes depressed, and so meeting with the Ascention of the *Viscera*, causes an Inflation, and high Intumescency or swelling up, with a mighty strugling: so that the laces of those in this Distemper must be forthwith loosned, or else they are in danger of falling into a Trance: In the mean time, the *Diaphragma* being so depressed, and its Diastole continued, the Blood remains almost immovable in the *Præcordia*; and so by its Stagnation, causes a great Oppression, and very often a failing of the Vital Function: Further, the Convulsion of the *Diaphragma* happens sometimes towards the upper parts, and so that driving the Lungs upwards, induces a violent Systole, and protracted longer than it should be; and when by this means the Blood is driven forward into the Pneumonic Vessels, and is not at last received from the bosom of the Heart, it Stagnates there, and besides in the whole Body; from whence the oppression of the Heart, and oftentimes a swooning, yea sometimes a want of Speech, and Motion, now with a blewness of the Face, and now with a dead Aspect follow: After these things are acted in the lower, and middle Region, at length the Distemper reaches to the Head, by the Passage of the Nerves, as it were a fiery inkindling, and the Spirits being there Exploded, leaping now towards the middle of the Brain, produce a swimming in the Head, and often symptoms very like the *Epilepsy*; sometimes the Spirits there Exploded rush into the beginnings of the other Nerves, and there stir up the like Explosions; wherefore Hysterical people, towards the end of the Fit often Laugh, or Weep, or talk idly; sometimes the parts of the Face and Mouth, yea sometimes the Arms, and other Members are troubled with Convulsive Motions; and so when at length all the Spirits which had contracted an Heterogeneous *Copula* are Exploded, the Fit ends; but presently after, matter for another Fit begins to be gathered together.

From whence the diversity of the Symptoms happens.

It sometimes happens, that the Convulsive Disposition is not drawn out so long and largely; for besides that, oftentimes the Nerves onely of the wandring Pair, and the Intercostals are troubled with it, that neither the Brain, nor the outward Members are at all molested; yea sometime, neither the Interior Nerves themselves are possessed with the Morbific Cause thorow their whole Processes: for the Convulsive Disposition (as we but now intimated) oftentimes arrives not beyond the Enfoldings of the Spleen or Stomach, and then the Fit beginning from the Inflation of the *Ventricle*, or left *Hypochondrium*, is thought to arise not from the fault of the Womb, but of the Spleen: which kind of Distemper by and by being brought to the *Thorax*, and there involving the *Diaphragma* and Lungs with a Convulsion, stops Respiration, and the motion of the Heart, or in some manner preverts it: but then from thence the Fit passes over; now with, and now without a great Perturbation of the Head. These things happen indeed after a various manner, according as it happens that the Morbific Matter, or Explosive *Copula* descending from the Head is gathered together, as it were heaps of Gunpowder, more or less, now in this, now in that part. But concerning which matter, by what means the same being brought forth in the Head, first Affects the beginnings of the Nerves and so constitutes the Procatartick, or more remote cause of the passion called Hysterical, now remains next to be inquired into.

The more remote cause of the disease, subsists, either nigh the beginnings of the Nerves.

As to the Morbific Matter, or Explosive *Copula* which cleaving to the Spirits, flowing within the Head, and with them derived into the Nervous Passages, is often the cause of the Distempers commonly termed of the Womb; we say, that this, as in other kinds of Convulsions, is the Heterogeneous Particles poured forth from the Blood, which yet are wont to be affixed to the Spirits, flowing into the beginnings of the Nerves, chiefly for two Causes: to wit, either by the fault of the Spirits themselves, or by the force of the matter it self, instances of either kind are ordinarily met with. It sometimes happens, that the Animal Spirits, planted within the Brain, and in the passage leading from it, to the *præcordia*, are very much disturbed by a sudden Passion, as of Fear, Anger, Sadness, *&c.* and forced into disorders, and that by that means they being driven out of their orders, do acquire to themselves Heterogeneous Particles, where ever met with;

and

and combine with these, that by and by for that reason, they acquire an explosive disposition, as we have already declared. Further, in the Second place, sometimes the Morbific matter it self, being made more fierce and strong, in spite of the succour of the Animal *Æconomie* or rule, is poured forth into the Brain, and its Appendix, from the Bloody Mass, which cleaving fast to the Spirits, presently disposes them into Explosions: This is ordinarily discerned in the Evil Crises of Fevers, also in some Malignant Distempers; also in Scorbutic and other Cronical Diseases ill cured. An ill or weak Constitution of the Brain, or Nervous Stock, whether it be Hereditary, or acquired, by reason of an ill manner of living, very much cherishes these causes. For in bodies so disposed, both the Animal Spirits, from every light occasion, are moved in Confusion; and the passages of the Brain and Nervous *System*, more easily lye open, for the running in of the Heterogeneous and Explosive Matter. In truth, for this reason Women are more obnoxious to Convulsive Distempers than Men, and some Women than others, as we will shew more largely hereafter.

But although these kind of Passions of Women, called Hysterical, most often proceed from the fault of the Head, or from the Morbific Cause arising within the *Encephalon*; yet sometimes such Distempers are stirred up by reason of a Cause beginning somewhere else, *viz.* Now in the Womb, now in the other Bowels: and of this Convulsive Pathologie, there are chiefly Two Heads, *viz.* *Or near the Womb, or other Inwards.*

1st. Sometimes it happens, that a Tumour, or an Ulcer, or a Congestion of sharp Humours, arises in the Membranous parts about the Womb, or planted about the other *Viscera*, and often irritates the parts so Distemper'd, by reason of the breaking of the Union into painful Convulsions: then forasmuch as the Animal Spirits placed round about, and those inflowing are moved into frequent disorders, they at length getting to themselves Heterogeneous Particles, sent either from the Distemper'd part, or from some other place, are disposed to Convulsive Assaults; and when first of all the Convulsive Motions happen onely in the Neighbourhood of the Affected Place, to wit, that the Bulk ascending in the lower part of the Belly, or its swelling up be onely perceived; afterwards they are propagated by the passage of the Nervous Bodies, and by the consent of the Convulsion there begun, leasurely into the other *Viscera*, of the lower Belly, then to the *Præcordia*; and lastly, into the Head it self: and the Distemper being thus by little and little dilated to the Spirits inhabiting the Brain: they moreover, having gotten in their proper Sphear, an Heterogeneous *Copula*, retort the same back to the *Viscera*, and so the Morbific Cause being made reciprocal, is begun at either end of the Nervous Trunk. Some time past I have seen a Noble Virgin, in whom a small Tumour arising, with most cruel pain below the *Os pubis*, did stir up huge Convulsions, first in the lower Belly, and afterwards ascending to the *Præcordia* and Head, were at length stretch'd to the outward Members: for once or twice in a day, after that great Pains did Torment her in the Affected part, the *Abdomen*, and by and by the *Hypochondria*, were wont to be lifted up: then difficulty of Breathing, on an Insensibility succeeded, and presently the Distemper being brought outwardly, most horrid Convulsions and Contractions of the Members and Limbs followed. Sometimes it also happens, that Convulsive Symptoms are induced in Child-bearing Women, by reason of some hurt or evil brought to the Womb: *Harvie* relates, That wonderful Convulsions were caused by the injection of some sharp thing into the Womb: So sometimes, though rarely it happens, that a Morbific Matter, or Explosive *Copula* is fixed to the Spirits dwelling about the Extremities of the Nerves, and near the Womb, immediately from the place there Affected, and without fault of the Brain. *This last happens after a twofold manner.* *Either by reason of the dissolution of the union.*

There yet remains another case, or manner of Affecting, by which the Convulsive disposition is produced from the fault of the parts, lodg'd at a great distance from the Brain (though in the mean time, the Taint, which is the cause of this Distemper, is often mediately Communicated to the Brain it self) to wit, when at any time the Nervous Juice is hindred somewhere in its Motion or Circulation, from thence stagnating in the Nervous parts, and loading them, does often bring in a Convulsive Disposition: So, when some usual Evacuation, whereby the Superfluities of the Nervous Liquor, were wont to be sifted forth, is stopp'd, as from Issues suddenly shut up, or old Ulcers dryed up without a Purge, many fall into Convulsive Distempers: Yea, it may obtain here some place, what is wont commonly to be noted for a Cause of the Hysterical Passions in Maids and Widows, to wit, the untimely restraint of the Seminal Humour, which ought to be bestowed about the Pleasure of *Venus*; at least, if they receive help from the state of a Conjugal Life, it therefore happens, because the Retagnations of the Nervous Humour, which often fix a Taint to the Brain and Nervous stock, by this means are prevented: Moreover, the Nervous Juice flows back towards its beginning, because its Passage is somewhat shut up, by a swelling or Cancrous *2. Or by reason of an obstruction of the Nervous juice.*

Tumor. Lasty in this City, a notable instance of this kind of Distemper hapned, *viz.* A certain Maid of Twelve years of age, had contracted an *hernia* or burstness, hence by the order of her Mother, she wore a Truss ill fitted, for a fortnight, not without great pain and torment, a little hard knot much pressing upon the *glandula's* of the Groin: within this space (when before she was perfectly well) she began to complain of a giddiness and heavy dulness of her head; and so a little after she felt Convulsive, and as it were Hysterical Distempers, frequently falling upon her; together with it great swellings arose behind her ears, and in her neck of the same side, to which she was never before obnoxious in all her life. It is not to be doubted in this case, but that from those *Glandula's*, which are the emunctuaries, or sinks of the nervous Liquor, being too much pressed together, the superfluities of that humor, wont to be sent away from thence by the Lymphatic Vessels, restagnating in the head, brought forth those evils; because the arising of the aforesaid symptoms so suddenly and manifesty followed upon the wearing of that Truss upon the Groin, that even her Mother laid the cause of the Disease upon that occasion. Besides, also I have observed in others, the recrements of the nervous humour, being somewhere stopp'd in their course, restagnating towards the head, have not only brought in Convulsive symptoms, but from thence the *Kings Evil.*

Objections against the aforesaid hypothesis answered.

So much for the formal reason of the different original of the Distemper called Hysterical; as also of the *genuine* causes of its symptoms: Out of which, it seems to appear plainly, that those passions do not depend always on the Womb, but much more often on the fault of the brain, and of other parts of the nervous stock: But many things are objected against these; which according to the old opinion, cast all the blame on the Womb: to wit, it seems so to be done because the assault of this Disease invades almost only Women, yea and Women that are not well about their Womb, *viz.* Child-bearing Women, or such who have their Courses stopt, are chiefly obnoxious to it: Besides it may be argued from things helpful for it, because a Plaister worn upon the lower part of the belly, also a strict girding of the belly and *Hypochondria*, by which the ascent of the Womb may be hindred, do not seldom drive away the fit, just falling on them; this also shews it, that sweet things held to the Nose brings on the fit, and stinking things drive the same away, it is said to happen quite contrary, if the same things be laid to the belly or privy member.

That we may wipe off these objections, we say first, that the symptoms, which seem hysterical, do not only happen to Women: for we have shown already, by the History brought by us, that a certain man has been obnoxious to those kind of fits, with the ascention of a bulk in the bottom of the belly: but that Women are much more often troubled with those Convulsive Diseases than men, two reasons may be shown, *viz.* First, for that their animal constitution is much weaker: to wit, they have the brain and nerves softer, and of a less firm texture, that they are not able to suffer any thing strongly, or to resist every injury; also the animal spirits in them, being more prone to flight and distraction, more easily admit an heterogeneous and explosive *Copula:* from hence Women, from any sudden terror or great sadness, fall into mighty disorder of spirits, when men from the same occasion are scarcely disturb'd at all. Secondly, Women more readily receive the Convulsive disposition, because they gather a more plentiful heap of the morbific matter: for that, whilst they lead for the most part a sedentary Life, the blood, for want of ventilation, becomes more impure; besides in this sex it originally abounds with heterogeneous and fermentative Particles: wherefore it is convenient for it to be more often purged by the flux of their Courses; by which notwithstanding, not always what is extraneous and incongruous, is wholly cast forth from the bloody mass, but that there remains that which being poured on the brain and its appendix, as occasion is given, becomes the cause of the Convulsive Distemper: Moreover, when the menstrual flux, being stop'd, a Convulsive disposition is occasioned; it is not therefore to be thought that such a Distemper is rais'd up from the Womb, but that the bloody mass, being more than usually imbued with heterogeneous Particles, carries them, together with the nervous juice, to the head: yea, chiefly for this reason also, Child-bearing Women are found obnoxious to the Passions, as it were Hysteral; for besides, that the membranes of the Womb being hurt, a Convulsion there begun, by reason of the felt trouble, creeps upwards, and is at last communicated to the head; it most often happens, that the blood being infected, by the terms being retained, grows hot with a Feverish burning, and then instead of a *crisis*, the malignant infection is carried to the brain, from whence Convulsive, and not seldom soporiferous or sleepy Distempers are excited.

But

But that it is argued, that this Diſeaſe ſeems to be Hyſterical, becauſe Remedies amplied about the *Abdomen*, often bring help; it will be eaſie to ſhew, that the morbific cauſe planted in the meſentery, oftner than in the Womb, is ſometimes either taken away by that means, or reſtrained from its influence: beſides, the ſame kind of applications, about the *hypegaſtrium*, are no leſs profitable, altho the original of the Diſtemper, be derived from the head it ſelf: for we have ſhewn before, that when the heterogeneous and exploſive matter, deſcending from the head, brings a Convulſive diſpoſition to the ſpirits diſpoſed within the whole proceſſes of the interior nerves; the Convulſive motions therefore excited, begin from the extremities of the nerves, and ſo creep upwards towards their beginnings; ſo that firſt of all the *Viſcera* of the lower Belly, then the *Præcordia*, and laſtly the Brain it ſelf are affected; but if the outmoſt ſpirits *viz.* thoſe dwelling in the enfoldings of the meſentery, be reſtrained from entring into exploſions, all the reſt, in the remaining nervous paſſage, continue in their orders: and this, Plaiſters worn upon the Navel, do often effect: for they repreſs, and compel into order with their odour, the ſpirits from leaping forth; yea alſo, not ſeldom, they ſhake off and drive away, the *Copula* cleaving to them: wherefore, when the exploſions there about to be made, are reſtrained, the Convulſive fit is wholly prevented: which yet is more apparent, for that, if the Convulſion begun in the lower belly, and from thence aſcending like a Globe, be preſently ſuppreſſed, and by a ſtrong binding together of thoſe parts, it be hindred that it creep not upwards, oftentimes the Convulſive Paſſion is broken off, the *Præcordia* and the Brain being untouch'd: wherefore it is a common cuſtom for ſick Women, to bind ſtrictly the *Epigaſtrium*, with ſwathes or rolers, and ſo to ſtop the progreſs of the ſymptoms towards the upper parts: For when the animal ſpirits enter into Convulſions ſucceſſively, as it were a fiery enkindling, wherever the tinder or cheriſhing matter is cut off, or intercepted, the Diſtemper is there reſtrained.

As to the various effects of odors, to wit, that ſweet things bring on the fit, but ſtinking things drive the ſame away, it may be ſaid, that the former do looſen the animal ſpirits, by pleaſing them, and too much releaſe them from their wonted tasks of influence, and ſo provoke them ready to be exploded, in ſuch diſorders, yea and as a flame put to them, do ſomewhat inkindle them: but on the contrary, ſtinking things repreſs the ſpirits, drive them back from excurſions and exorbitances, and compel them into order, yea like Sulphur, mixt with *aurum fulminans*, take away from them their exploſive force.

What we have hitherto ſaid, of the Paſſions called from the Womb Hyſterical, will yet more clearly appear, if for the confirmation of our *Hypotheſis*, we ſhall add arguments taken from Anatomical obſervations; I will therefore lay before you a notable caſe, by which the former reaſon, and cauſes of the Convulſive Diſtempers, may be very much illuſtrated.

Obſervation. A very Noble Lady, of a moſt curious ſhape, and highly indued with a virtuous diſpoſition of mind and manners, of late lived near to this place, who being for many years obnoxious to Convulſive Diſtempers, for that ſhe had originally, or hereditarily contracted this ſickly diſpoſition, and had experienc'd the fruits of this morbid ſeed, almoſt every luſtre of her age, but chiefly as often as ſhe was with Child, (for ſhe very frequently miſcarried) was wont to be tormented above meaſure, with convulſive paſſions, as it were hyſterical; becauſe, preſently after the reſtraint of her monthly flowers, the heterogeneous Particles being tranſlated to the brain and nervous ſtock, cauſed fits of this moſt cruel Diſtemper.

After ſhe had newly conceived, in the firſt months, according to her old cuſtom, ſhe was preſently moleſted with Convulſive Diſtempers; about the ninth week of her big belly, from taking cold, ſhe fell into a dangerous Fever, in which very acute pains tormenting her in her loins and bottom of her belly, for many days, ſeem'd to threaten an abortion: but theſe pains, as the event ſhew'd, rather to be termed Colical, proceeded from a ſharp humor falling down into thoſe parts, from the brain, by the pipes of the nerves: for towards the declining of the Fever, this matter being ſomewhere elſe tranſlated, a great looſneſs or Diarrhæa, pains of the feet, and as it were an Ulcerous diſpoſition ſucceeded.

As ſoon as this Lady became well from her Fever, and thoſe pains, the Convulſive Diſtemper returned; for every morning, wakening from ſleep, ſhe was wont to ſuffer Convulſions, and cruel contractions, about the parts of her face and mouth, as alſo in her arms and thighs; which ſymptoms, without doubt, did ariſe from a ſerous heap or gathering, laid up in the head, about the beginnings of the nerves; and by them imbibed, together with the nervous juice, more deeply in ſleep; and when afterwards the ſame matter was carried by the pipe of the interior nerves, into the foldings of the

Mesentery and Loins, most cruel pains of those parts, and also fits as it were Hysterical, did most grievously infect her.

But these Convulsive motions of her face and members, after a little time ceased; but yet she still remained weak, and without strength, with a pale countenance, an infirm and trembling gate, and desirous only of congruous food, and hot Liquors: about the end of the third month, at which time she was wont continually to miscarry, her *menstrua* broke forth, which coming away for two or three days together, with little pieces of broken membranes, she expected to miscarry: But that flux ceasing, pains as it were of one in labour, in her *abdomen* and loins, as before arose, and for the space of a week, tormented her day and night; at length, having used a bath of *Emollient* herbs, and afterwards put to bed to sweat, she brought forth the burthen of her womb: the conception so coming away with mighty pain, was about the bigness, and like the figure of a Turkie egg: the exterior coat of it was torn and broken, the interior remaining whole, contained about half a pint of clear water, and nothing else besides; there appeared no shape of a Child, or any rudiments that it would ever be one: Afterwards for 4 or 5 days, her flowers flowed forth, with some pieces of broken membranes: in the mean time, pains with their wonted fierceness tormented her; and when the space of a week being elapsed, they left not off of themselves, remedies at length were sought to allay them.

To this end, first Liniments, Fomentations, Baths, and Clisters, were often administred: also Medicines purging the filth of the womb, on which the cause of all the evil was cast, were taken inwardly: Short intermissions of her tortures followed upon the use of the former; but then the Distemper returned, with great trouble; yea the Disease much increasing, in three weeks time, got many other horrid symptoms: for besides the pains in her belly and loins, which became more cruel every day, also she was shortly after tormented in her back, neck, shoulders, as also in her arms and thighs, with most cruel pain; and that more bitterly, as soon as she was warm in her bed; besides, she was afflicted with a frequent giddiness, vomiting, and nauseousness, and often in a day, with most grievous Convulsive fits, *viz.* First a bulk was seen to ascend in the bottom of her belly, and presently it lifted up her whole belly forceably, by and by respiration being restrained, an insensibility, with a dead countenance succeeded: after that she had thus lain as one dead, for three or four minutes of an hour, she was wont suddenly to leap up, that she could hardly be held down, or kept by those standing by; then followed cruel contractions, and distortions in all the parts of the mouth, and face, as also in all the members of the body: These symptoms were indeed judg'd to be Hysterical, because this Noble Lady so lately had miscarried.

But weighing every one of these, I was at last of this opinion, that the cause of either fit, *viz.* Both the *dolorifick*, and the Convulsive, did depend wholly on the evil affection of the brain and nervous stock, and that without any fault of the womb; for that a sharp humor being heaped up within the head, did from thence descend thorow the passages of the Nerves, into parts at a great distance; which lodging upon the membranes and *Fibres*, and fermenting with the humor, flowing in from the bloody mass, did irritate them very much, and so stir'd up most cruel pains: Then afterwards, when the heterogeneous and explosive particles, being admitted with what humor within the head, and entring into the nervous passages, did cleave to the spirits: therefore the Convulsive disposition, then breaking forth into grievous fits, was induced, as shall be by and by more largely laid open.

Instituting Curatory intentions, according tot his kind of *Ætiology*, I order'd to have blood taken from this sick Lady, at what time she most grievously laboured, out of the *Saphena vein*, and within two days, to be given her a gentle Cathartick, and that to be reiterated, once or twice in a week: Also on other days, Morning and Evening, I gave her spirits of *Harts-horn*, and at other hours, twice or thrice in a day, of the *Powder of Pearls*, and *Crabs-eyes*, with a Dose of the following Julup: Take of the *water of Snails*, and of *Worms magisterial* each three Ounces, of *Saxifrage*, and *black-Cherries* each four Ounces, of *Hysterical water* two Ounces, of the *Syrrop of Corrals* an Ounce and a half, of the *tincture of Costor* one Dram, mingle them: The bath of sweet herbs was frequently used; when necessity urged, she took *Opiats* always with good success: *Vesicatories* were applied to the inward part of either thigh, also to the hinder part of her neck; also *Fomentations*, *Oyntments*, *Clisters*, *Cupping-glasses*, *Sneezing-Powders*, with many other manner of administrations were prescribed, according to the exigences of the symptoms.

By this method observed for about 14 days, the Noble Lady having received very much ease, was wholly rid of her Convulsive fits. Yea, the torments of her bowels and members, and the other symptoms being very much lessen'd, she hoped quickly to recover

recover her health: But after this, partly by reaſon of an ill order of Diet, which the ſick Lady always indulg'd her ſelf in, or taking little, but chiefly, by reaſon of a ſudden paſſion of fear and ſadneſs, which an unlucky accident hapning within her own Houſe, had cauſed, ſhe fell into a relaps, by and by the Diſeaſe growing into a much worſe condition, for both the Convulſions and Pains did infeſt her more bitterly; yea, and her ſtomach being almoſt tired out with continual Vomiting, would not admit either of Food or Medicines. She took Aſſes milk for ſome days, with ſome ſucceſs; which notwithſtanding, foraſmuch as breeding Choller in her ſtomach, ſhe found it troubleſome, ſhe ſhortly omitted: at length in ſpite of all Remedies, preſcribed carefully by the conſultation of many Phyſitians, my noble Patient from day to day grew worſe, and by degrees death approached: Two days before her death the torments of her belly and loins very much abated, and ſhe became more than uſually chearful, and conceived ſome hope of Recovery; But in the mean time ſhe complained of a pain and great heavineſs in her head; and about the beginning of the night ſhe ſlept ſoundly, but being awakened ſhe fell into a very horrid convulſive fit, which preſently paſs'd into a quick deadly *Apoplexie*, for being made inſenſible and ſpeechleſs, ſhe left this life within twelve hours.

The rational account of the Diſeaſe taken from Anatomical Obſervations.

When various judgments had paſſed about the cauſe of the ſickneſs, of which this illuſtrious Lady died, moſt flinging all the evils on the Diſtemper of the Womb; others on an Ulcer or Impoſthum, which they ſuſpected lay hid ſomewhere about the *Viſcera* of the *Abdomen:* it pleaſed her Friends, that her dead Carcaſe, kept long opened for the Funeral, ſhould be dilligently inſpected, and ſo the genuine cauſes of the Diſeaſe, and her Death, might be inveſtigated: which task being left to my care, I executed with all the dilligence I was able.

Therefore in the firſt place, it was worth Obſervation, about the habit of the body, that the members and lower parts, nigh and beyond the ſeats of the pains, were very much waſted: as her thighs, quite worn away, appeared like a Skelliton: In the mean time her face, neck, and arms, remained full and plump enough: from whence it appears, that the nervous Liquor does help no leſs to the buſineſs of nouriſhment, than to the exerciſe of the animal faculty: wherefore, when that Liquor, being much hindred in its paſſage, the loins and belly taken up with the continual Convulſions, did not deſcend, with a due influx, to the inferior parts, they for that reaſon became preſently both without ſtrength, and lean, and waſted. This kind of Atrophie differs in this from other Hectical waſting, which happens from the vice of the blood, becauſe in this latter, an hippocratick or waniſh face, is the chief ſign of the Diſeaſe: in that firſt mention'd, the countenance, and aſpect, ſhow little or nothing of evil.

The dead body of this Noble Lady, tho very lean, and that her bowels were all emptied, yet quickly putrified, for within 40 hours all the skin was diſcolour'd, and appeared in this part livid, in that green, and in others blackiſh: and her Corps ſo ſuddenly putrifying, yielded a moſt horrid ſmell; the reaſon of which without doubt was, that by reaſon the muſcles were exerciſed with perpetual Convulſions, the principles of their mixture were ſo much looſned, that they being in a readineſs for diſſolution, quickly after death, fell aſunder one from another, after the like manner, as we may obſerve of the fleſh of wild Beaſts, which being tired with a long courſe, or beaten to death with Clubs, for this much ſooner putrifies, than the fleſh of thoſe which are kill'd quickly, and peaceably.

Her belly being opened, the Inteſtines and Ventricle appeared whole enough, *viz.* Intire and well-colour'd, but they were empty, and as it were blown up, foraſmuch as they were troubled, almoſt with perpetual evacuations, *viz.* Thoſe placed above or below: in all this cavity, no foot-ſteps of an Ulcer or Impoſthum were perceived. Whilſt we were ſearching the cauſe of the Diſeaſe, and rolling the inwards here and there, there was ſomething met within the meſentery worthy notice, to wit, about its middle, where it is fixed to the back, and contained the greater folds of the Nerves, a ſubſtance ſomewhat looſe, and inflated, as it were with many little bladders, equalling an hands breadth, was ſeen after that manner; as when in a ſhoulder of Veal the inter-ſpace of the Muſcles are blown up by the Butchers, that thoſe parts might ſwell up, and ſeem fuller and fatter: In this place of the Meſentery, becauſe it was more tumid and ſofter, we thought ſome humor the cauſe of the pain to lodg there; but opening it, I found only the Membranes to have been looſned one from another; and to conclude, nothing but wind within its inter-ſpaces: which ſeparation of the Membranes, and devulſion one from another, was without doubt induced by the frequent Convulſions or Exploſions of the ſpirits, which within the enfoldings and nervous *fibres*, there thickly planted, were almoſt continually provoked; and thoſe Convulſions hap-

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ned by reason of the Heterogeneous and Explosive Particles being derived thither from the head, by the pipe of the Nerves.

But as to those torments of the belly, and as it were an ascent of a bulk or substance in the Convulsive Distempers, and the inflation of the *Abdomen*, it is not to be doubted, but that the seat of the morbific cause did lie hid in that part of the Mesentery: but because so much suspition was had of the Womb, being chiefly affected, we did next inquire how much this inward deserv'd it: Therefore having dilligently searched the tunnel, placed within the *Os pubis*, I found the womb in its due place, and as to all parts sound, and well-furnished: its body was drawn to its just proportion, altho it was but five weeks since she had miscarried, *viz.* It was like a small pear in figure and magnitude; the *Glandulas* on either side of the bottom of it, which are called the Testicles, appeared very small and flaggy, without any superfluous or virulent humor contained in them: the body of the womb, wherever it was dissected, equall'd a Thumbs breadth in thickness, its inward cavity was no bigger than what would hold a Bean: within this hollowness, as use to be in the Caverns of other inwards, was included a mucous or dreggy matter, in a very small quantity: but in truth, about the Womb, or its *Appendix*, there was nothing, to which might be imputed as a morbific cause of the symptoms but now described: From whence therefore it may be demonstratively concluded, as I at first thought, that the Passions termed from the Womb Hysterical, are most often excited from some other cause than the fault of the womb.

The Intestines being removed, we found also the reins sound enough, but one of them was of an unusual figure, *viz.* It was cleft into many Lobes, like the Kidney of a Calf.

The *Milt*, *Pancreas*, and *Caul* without fault: the *Ventricle* was much blown up, and its inward Coat was plain without folds, or wrincles, which certainly hapned, by reason of its frequent Vomiting, this inward being almost continually troubled with Convulsions: Besides, for this reason, the tone of the stomach being broken, it did neither rightly desire, or concoct the food, or aliment.

The *Liver* very much differ'd from a sound constitution, for it was tumid and somewhat hard, of a pale colour, like rotten wood, wholly dry and without blood, and this without doubt, the frequent use of Cordial, and highly hot Liquors had effected.

The *Lungs* were of a blewish colour, and every where obstructed, and stuffed with a stinking and frothy matter: certainly this inward and the Liver had been vitiated of a long time, wherefore as the blood being degenerate, and very much depraved of a long time, from its right temper, had yielded the first seeds of this sickness, so also it afforded a constant cherishment of it.

But indeed, we sought, and that not in vain, for the chief, and as it were original cause of the Disease in the head; therefore the skull being taken off, the Vessels of the *Meninge*, and those creeping about the Brain appeared full, and distended with blood, when in the rest of the Body, scarce any Blood had flowed forth, in the cutting of it: the thicker *meninge* being removed thorow the other thin and pellucid one, was discerned a clear water, filling the enfoldings and crevices of the Brain, and as it were overflowing its whole substance: In truth, the serous heap of waters, had filled full all the cavities, and inward places of the Brain: the enfoldings of the *choroides*, or net-like membranes of the Brain, being a long while immersed in water, and as it were boiled, were become discolour'd and half rotten: nigh to the beginning of the Splanchnick nerves, or belonging to the Spleen, the water insinuating it self very much, had separated the *pia mater* from the trunk of the oblong marrow or pith, for two fingers breadth: without doubt, the morbifick matter descending from the head, by the passage of these nerves, into the enfolding of the Mesentery, was the cause of the pains and Convulsions: Further, the same matter also afflicting the heads of other Nerves, and passing thorow their Pipes, produced afterwards, these most cruel Distempers in other parts, to wit, almost every where of the whole body.

The method of Curing the Hysterical Distempers.

As to the Cure or means of healing, used in the Passions commonly called Hysterical: forasmuch as the symptoms of this Disease are very much Convulsive, therefore it is fit, that anti-spasmodic or anti-convulsive Remedies, such as were before described, should be chiefly indicated; but when these Distempers most often happen to the Female Sex, in whom for the most part, the menstrual flux, and other accidents of the Womb, do challenge a part in the morbific cause; therefore Medicines respecting the various dispositions of the Womb, are to be added to the former, and many ways to be compounded with them. The Therapeutic or Curatory Indications, are either Curatory, to be administer'd in the fit; or preservatory, which are instituted

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out of the fit, that take away the cauſe of the Diſeaſe, and prevent its comings or acceſſions.

1. As to the firſt, if the fit is wont to be light, and without other perturbation of the ſpirits, it may be permitted to paſs away of it ſelf; but if it being more heavily troubleſome, there will be need to bring ſome help to nature much oppreſſed, this only thing is to be done, that the ſpirits being freed from the Embraces of an Heterogeneous *Copula*, they may remit their inordinations and exploſions: For this purpoſe, it is grown into uſe, to put to the noſe ſtinking and ill-ſmelling things, the ſcents of which compel and repreſs the too fierce ſpirits, ready to leap forth into their orders, and alſo ſhake off from them the heterogeneous *Copula*, and often drive it quite away: *Aſafœtida*, *Caſtor*, *Galbanum*, being put into fine Linen, and applied to the Noſtrils, are convenient; alſo burning of *Partridg feathers*, *old skins*, and *ſulphur*. Beſides the ſpirits and *oil of ſut*, or of *Harts-horn*, do not ſeldom help: yet I have known theſe kind of fumigations, being very troubleſome to ſome Women, to increaſe the fit; it is probable that the ſame ſometimes may too much irritate the ſpirits, and drive them into greater diſorders; and as ſtinking things put to the Noſe, ſo the like poured into the mouth, do often bring help: wherefore we give often with good ſucceſs to Hyſterical people, *Tinctures of Caſtor*, *Solutions of Aſſafœtida*, and *Galbanum*, *ſpirits of Harts-horn*, and *Sut*, with proper waters. Take of the *ſpirits of Harts-horn*, from 12 to 15, and 20 drops, let them be taken in a little draught of the following Julup: Take of the *waters of Penny-royal*, and *Mugwort*, each three Ounces, of the *water* of *Briony* compound two Ounces, of *Caſtor* tied in a knot and hung in the Glaſs, half a Dram; of the whiteſt Sugar one Ounce, mix them. Take of the *Tincture* of *Caſtor* one Scruple to half a Dram: let it be taken in a little draught of ſmall Beer. Take of *Aſſafœtida*, and *Galbanum* two Drams, let it be diſſolved in *ſpirit of Wine* to the extraction of a red tincture. The Doſe one Scruple, in two or three ſpoonfuls of *featherfew-water*. *Riverius* very much crys up that of *Solenander*. Take of *Musk*, and of *Dragons-blood*, each one Scruple; take more or leſs of it in *water of the Lilies of the Valley*, three or four Ounces. *John Anglicus* commends *Parſnip-ſeeds*, or the *ſeeds of Penny-royal*, in Wine, or other proper Liquor, as a moſt certain Remedy. If the fit perſiſting a long time, ſhould cauſe want of ſpeech, or motion, the more ſharp Cliſters, as of *Briony-Roots*, and *Carminatives* boiled in water, are to be adminiſtred, and frictions of the thighs and feet are to be order'd; and if they ſhall yet grow ſtronger, Cupping-glaſſes are to be applied to the belly and groin, yea alſo, let them be often provoked to ſneezing: it is convenient to give ſome in the middle of the fit, a draught of ſimple cold water, or in which *Champhir* had been diſſolved. *Curatory.*

2. The preſervatory Indication comprehends theſe three intentions, *viz.* In the firſt place to take away, or to derive to ſome other place the impurities of the blood, apt to be poured forth on the brain and nervous ſtock. Secondly, to fortifie the Brain, and ſo to ſtrengthen the indwelling ſpirits, that they may either not at all receive, or may eaſily ſhake off the Heterogeneous *Copula*. Thirdly, to amend whatſoever is enormous in the womb, and contributes to the Convulſive diſpoſition. *Preſervatory.*

1. The firſt intention is performed by purging, and phlebotomy, and other common ways of purifying and purging the blood and humors. If there be opportunity for an emetic, I judg it beſt always to begin with it, eſpecially in Cacochymicks, or bodies full of evil humors, in the longing Diſeaſe, and Pica, and in ſuch whoſe great load of viſcous phlegm, ſtuffed within the folds and coats of the Ventricle, hinders the virtues of other Medicines: The next day after the Vomit, unleſs any thing bids the contrary, let blood be taken, in women of a hotter temper, preſently from the Arm, and afterwards if need be, from the Foot, or from the ſedal Veins with Leeches; but in bodies troubled with obſtructions, and leſs hot, let blood be taken more ſparingly, and more rarely, and only in places ſcituate below the womb: After theſe Evacuations (if they are to be ordered) rightly performed, once within ſix or ſeven days, a Purge is to be preſcribed according to the following forms: Take of *Pill-fetida major*, one Dram and a half, of the *reſine of Julup* xii. grains, of *Tartar Vitriolat*, and *Caſtor*, each one Scruple, of *Ammoniac* diſſolved in Hyſterical water, what will ſuffice to make xii Pills, for iii Doſes. Or take of the *reſine of Julup* gr. xviii. of *Calomelaus* one Dram, of *Caſtor* one Scruple, make a Powder, let it be divided into iii. parts, for iii Doſes, let it be given in the pap of a *roaſted Apple*, or in *Conſerves* of *Borage*: ſo thoſe indued with a more hot temperament, a Doſe of extract, or our ſolutive Syrrop may convenienty be adminiſtred: for the revulſion of the morbific matter from the head, Iſſues made in the calf of the leg, or thigh, and ſometimes veſicatories, legatures, and painful rubbings, are wont to be adminiſtred: But not only a purging of the blood, and a revulſion of its tecrements from the head, but an alteration of its Liquor, and reducti-

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on of it to its due temperament, have here a place: Wherefore in some hysterical people, steel Medicines help, in others the use of Spaw-water, or whay, in others the baths are wont to be signally profitable.

The second intention, to wit, the rectification of the brain and animal spirits, is performed with Cephalic, and properly anti-convulsive Medicines: which indeed are to be diligently exhibited almost every day, when they do not Purge or Bleed: since there are various *Species* of such like Remedies, and several manner of administrations, we will here add some of the more choice forms:

Take of the Lees of *Bryony*, *Assafœtida*, *Castor*, each one Dram; of the *Salt of Coral*, *Amber*, *Tin*, each half a Dram; of *Galbanum* dissolved in Hysterical water, what will suffice to make a mass: Dose half a Scruple to a Scruple, Morning and Evening, drinking after it a Dose of proper Liquors.

Or, Take of the *Seeds* of *Wild parsnips*, of *Nettles*, each two Drams, of *Vitriol of Steel* one Dram, of the extract of *Gentium*, *Featherfew*, each a Dram and a half, with what will suffice of the *Syrrop of Mugwort*, make a mass, let half a Dram be taken after the same manner.

If the form of a Powder pleases better; Take of the *Roots of Virginian Snakeweed*, and *Contrayerva*, each one Dram and a half, of *Coral* prepared, of *Pearls*, of *white-Amber*, each one Dram, mingle them, make a Powder: Dose one Scruple to half a Dram, Morning and Evening, with an appropriate Liquor.

Opiats are composed after this manner: Take of the *Conserves* of the *flowers of the Lilie Convallis*, of the *male-Pæony*, of *Betony*, each two Ounces, of the *Seeds* of *Pæony*, of *red Coral* prepared, each two Drams, of the powder of *Cretic Dittany* one Dram and a half, of the *Salt of Wormwood* two Drams, with what will suffice of the *Syrrop of the rinds of Citrons*, make an Electuary. The Dose Morning and Evening the quantity of a Nutmeg. After the same manner may be given to poor people *Conserves* of the *Tree of Life*, or of the *leaves of Rue*, twice in a day.

The Liquors appropriate against the Hysterical affections, and to be drunk after the aforesaid Medicines, are, either distilled waters, which are to be taken by themselves, or with other things, in form of a Julup; or Decoctions, or Tinctures and Infusions.

Take of the *water of Mugwort*, and of *Penny-royal*, each half a pint; of *Hysterical water* four Ounces, of the *Tincture of Castor* half an Ounce, of the *Syrrop of Corals* one Ounce and a half, mix them. The Dose from an Ounce to an Ounce and a half, with any of the Medicines afore described.

Take of the *leaves of Penny-royal*, of *Featherfew*, of either *Southernwood*, of *Calaminth*, of *Nep*, and of either *Horehound*, each one handful, of the *Roots of Briony* four Ounces, of the *Seeds of Parsnips* two Ounces, cut and bruised; put them into White-wine or Cider, six pints, and so distil them according to art.

Take of the *Root* of the *Male-Pæony*, *Angelica*, *Valerian*, each half an Ounce, of the *leaves of Mugwort*, *ground-Pine*, *Calaminth*, *Penny royal*, and *Misletoe of the Oak*, each one handful, of the *Seeds* of either *wild-Parsnips*, each three Ounces, of *Raisins* one handful; let them be boiled in four pints of *Spring-water*, to the half: add to it of *White-wine*, one *lib.* i. *ß*, strain it, and keep it in close Vessels: The dose three or four Ounces, twice in a day.

Take of the *wild-Parsnip Seeds* bruised, two Ounces, of *Castor* one Ounce; let them be put into a Glass, with one quart of *white-wine*. The Dose two Ounces twice in a day.

3. As to the third intention, which inhibiting the disorders of the womb, doth promote the cure of the passion called Hysterical; I say, first of all what in times past was believed, concerning the cause and scope of curing the Disease, that the womb did ascend, therefore that it ought to be reduced into its right place, is altogether fictitious, as we have elsewhere shown: The falling down of the womb, or its coming forth, oftentimes happens; but rarely or never produces the Hysterical Distempers: Besides, the dislocation of the womb in child-bearing Women, sometimes happens presently after their bringing forth, to wit, when the body of the womb being made capacious, and newly emptied, doth not sink down or fall within the Tunnel in its right place, but upwards, inclines now to the right side, now to the left; and there being drawn together like a purse, is folded into a great bulk, which kind of bulk remaining long nigh the side of the Groin, is wont to give a suspition of another Child, or the secondine or after-birth to be left behind, or also of some hard swelling tumor there increasing; but afterwards, when the *menstruum* coming plentifully away, the womb is reduced to its due magnitude, that tumor by degrees vanishes: but while it there remaineth, unless for that reason, the *Lochia* or *Menstrua* were stop'd, it doth not produce the Hysterical Passions. For the reducing of this part the sooner into its due position, Fomentations,

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Liniments, and Plaisters are convenient. But most times that symptom passes over of it self, without any further harm. To what other distempers the womb is obnoxious in child-bearing, and by what method to be helped, we have fully shown in another place. As to the other vices of that part, which happen to some women, not bearing Children, we declare that they chiefly are either a disease of the womb, made by the breaking of the unity, *viz.* which is either some Ulcer, or Tumor; or an inhibition of some wonted excretion, or putting forth, to wit, a suppression either of the menstruous blood, or the whites, or the seminal humor: Moreover, because of the *Menstrua* being retained, the heterogeneous particles being often poured forth into the head, bring the Convulsive passions: in like manner, when the whites are stopped, the excrementitious matter being supped up by the blood, is deliver'd to the brain and nervous stock: yea, when an usual evacuation of the Seed is hindred, the superfluities of the nervous humor flow back upon the brain, and infect its indwelling spirits with an explosive and morbific tincture: There is no need here, to discourse more largely or particularly of those Peculiar distempers of the womb, but to compound medicines, and intricate administrations, proper for womens diseases, with anticonvulsive Remedies.

CHAPTER XI.

Of the Distempers commonly called Hypochondriack, *which is shown to be for the most part Convulsive: briefly also of* Chalybeats *or* Steel Medicines.

IN the foregoing Chapters we have clearly shown, that the Passions called Hysterical, do not always proceed from the womb, yea, more often from the head being distemper'd: next, we shall inquire concerning the Hypochondriacal Distempers, of what original and nature they are, and upon the fault of what parts they chiefly depend. The vulgar opinion is, That the symptoms wont to accompany this Disease are wholly produced from the Spleen; wherefore, they are ascribed very much to vapours arising from this inward, and variously running up and down here and there; when in truth, these sicknesses for the most part are convulsions and contractions of the nervous parts: but that it might appear by what causes they are wont to be excited, we ought to consider first the symptoms themselves, and to place them into some order or rank.

A description of the hypochondriacal affections.

As to the Distempers therefore which are vulgarly termed *Hypochondriac*, it is observable, that they happen chiefly to men of a melancholly temperament, with a dark aspect, and more lean habit of body: it is rarely that this Disease troubles fair people with a fresh countenance, or also those indued with a too Phlegmatic complection: It betrays it self in manifest signs, about the height or midst of their Age; men are found to be more frequently obnoxious to this, than women; being made habitual in either; it is very hardly, or not at all to be cured in women, by reason of their weaker Constitution; it is accompanied with a great many more Convulsive Distempers; wherefore commonly it is said in this Sex, the Hysterical to be joyned with the *Hypochondriacal* Passion.

The symptoms which are imputed to this Disease, are commonly very manifold, and are of a divers nature; neither do they observe in all the like beginning, or the same mutual dependency among themselves: for they seem in these most to affect the Inwards of the lower belly, in those the *Præcordia*, in others the confines of the brain: and in most, though not in all, the ventricle labours much; concerning the appetite it is often too much, but presently burthened with what it hath taken in; and when the food, staying longer in it, by reason of slowness of concoction, their Saline particles being carried forth into a flux, pervert the whole mass of the Chyle into a pulse or pottage, now sour or austere, now salt or sharp: from hence pains in the heart, great breakings forth of blasts, rumbling of wind, and often vomiting succeed; and because of a pneumatick defect, or of spirits, the chyme or juice is not wholly made volatile, and carried forth of doors, but that the ballast of the viscous or slimy matter, sticking to the coats of the ventricle, is left behind; an almost continual spitting infests

them; a distention in the *Hypochondrium*, and often there, and under the ventricle, a cruel pulsation is felt: also there pains ordinarily arise, which run about here and there, and for many hours miserably torment with a certain lancing: in the mean time, from the contractures of the Membranes, and from the fluctuation of winds, stirred up by that means, rumbling and murmurs are produced: Also in the *Thorax*, oftentimes there is a great constriction and straitness, that the respiration becomes difficult and troublesome upon any motion: also, most grievous asthmatical fits fall upon some: moreover, the sick are wont to complain of a trembling and palpitation of the heart, with a noted oppression of the same: also a sinking down or melting away of the spirits, and frequent fear of a trance comes upon them, that the sick think Death is always seising them: In this Region, about the membranes, and chiefly the *mediastinum*, or that divides the middle of the belly, an acute pain, which is now circumscrib'd to one part, now extended to the shoulders, is a familiar symptom of this Disease. But indeed in the head an iliad of evils doth for the most part disturb Hypochondriacal people, to wit, most cruel pains returning at set times do arise; also the swimming of the head, and frequent *Vertigoes*, long watchings, a Sea, and most troublesome fluctuation of thoughts, an uncertainty of mind, a disturbed fancy, a fear and suspition of every thing, an imaginary possession of Diseases, from which they are free; also very many other distractions of spirits, yea, sometimes melancholly and madness accompany this sickness: besides these interior Regions of the Body beseiged by this Disease, wandring pains, also Convulsions, and numbness, with a sense of pricking, invade almost all the outward parts; nightly sweats, flushings of the blood in the face, and the palms of the hands, eratick Fevers, and many other symptoms of an uncertain original, do every where arise; concerning which, forasmuch as the genuine causes, and the manner of their coming to pass, could not be readily determined, presently all the fault is cast upon the Spleen, and Physitians accuse that, as if it were the chief Author of every irregular Distemper: but by what right or authority, by and by shall be sought into: In the mean time, it is to be observed, that the chief symptoms of this sickness, are Convulsive, and depend immediately upon the irregularities of the animal spirits, and the nervous juice, rather than on the evil disposition of the *Viscera*, serving for concoction. But indeed, from whence the first rise of this most complicated Disease proceeds, and by what means it brings forth the divers manners of Distempers in so many places, will not be so easie to determine.

The hypochondriacal Distempers belong to the nervous kind.

It would be a tedious thing to shew here, what the ancient and modern Physitians thought of the *Hypochondriac* Passion, and of its essence, and causes; we will only take notice, that most of them do ascribe this sickly Disposition to the only fault of the Spleen; In the mean time some contend that the whole confines of this Inward, partaking of part of the fault, the blood flowing every where in the Splenetic and Epigastric Vessels (or those belonging to the Spleen and belly) for that it being guilty of an hot and dry intemperature, and so obnoxious to too much fermentation, brings forth the original, or gives a beginning to this manifold evil: But the famous *Highmore* affording relief as well to the Spleen as the Womb, hath cast the chief cause of this Disease wholly on the vitious constitution of the Ventricle; and from thence he would have the reasons of the aforesaid symptoms to be originally sought: But indeed, that he might frame a fit *Hypothesis* for the solving the *Phænomena* of this sickness, he first supposes the tone of the stomach to become too loose and weak, that for that reason it hardly and very imperfectly concocts the aliments: so that the thin and more spirituous part of the Chyle, being sent from thence, sooner than it ought, to the blood, perverts its disposition to a hot and sour temper; then the residue of the food, by a longer stay within the Ventricle, degenerates into a ponderous, and viscous or clammy Phlegm; which also, by its stagnation (even as it is observable in things to be eaten, being longer kept) becomes very sour, or sharp: But from hence that learned Man argues, that from the blood made too serous and thin, its effervescencies quickly passing thorow it, are induced: and from the stomach, loaded with ballast of ropy or viscous matter, the wind and distentions of the Ventricle and *Hypochondria*, as also the belching, and troublesome spitting do arise: whereby indeed, he wholly exempts the Spleen from this fault; he contends, that it doth neither draw to it self the melancholly dregs of the blood, nor serves for any office whatsoever, about the sanguification or the making of blood; but that its use almost only consists in this, that this Inward swelling up, or growing turgid with very hot blood, it administers heat to the adjacent Ventricle, and cherishes it with gentle warmth.

The causes of the Hypochondriac passion is inquired into.

Altho I may so far assent to this famous Author, concerning this opinion, that I yield, the ventricle doth often grievously labour in this Distemper, forasmuch as the tone of which, being made lax, and its strength broken, by reason of the indigestion of the aliment

The Hypothesis of Dr. Highmore sifted.

ment, a load of viscous Phlegm, or Petuitous matter, is begotten even in its bosom, to which, by reason of the Saline Particles being brought into a flux, by their long stay, oftentimes a notable sourness and austereness happen; then because the fault in the first concoction is not mended, the dyscrasies and disorders of the blood receive that want of digestion in the second: But yet he cannot draw me into that opinion, that the ventricle is always chiefly in the fault, or that the other symptoms of the Hypochondriacal Disease, depend only on its vitious constitution: For I have known many cruelly afflicted with this sickness, who have been well enough in their stomach: although they have very much complained of the pulsation in the left Hypochondrium, of the straitness of the breast, and a wandering pain excited in it; also of the trembling and oppression of the heart, with a continual fear, and disturbed Imagination; in the mean time, they were wont to desire food greatly, and to digest whatsoever was eaten, without any trouble of the ventricle, or heaviness, and also without any spitting or acid belching: yea, I have observed others, great drinkers, and using an evil manner of living, to have contracted a looseness of the stomach, with an ill digestion, windiness, and frequent vomiting, who sound enough about their *Præcordia* and animal faculties, were not at all accounted for *Hypochondriacks*: Besides, in this Distemper, the ventricle is often rather sick from the vitiousness of other parts, or of the blood, than from its own default; because, it is usual for those sort of sick people to be well in their stomach, so long as they may lie a bed, and breathe it forth; but when they are raised up, the pores being shut up, and the dregginess of the bloody mass stagnating within, presently to be afflicted with the pain of the heart, an aggestion of wind, and frequent endeavours to vomit.

For these and other considerable Reasons, I judg the original of the *Hypochondriacal* Disease, to be derived from some other Fountain than the weakness of the Ventricle: but forasmuch, as among the parts here primarily suspected to be affected, great complaints are made against the Spleen; it will be worth our while to enquire, what office this Inward doth discharge; then, as often as it fails in it, whether it contributes to this Disease.

The use of the Spleen is inquired into.

Though I may grant with Doctor *Highmore*, that the Spleen doth cherish the Ventricle with its warmth, and so perhaps in some measure help Concoction; yet I do not conclude this part to be framed chiefly for that end, but for some more noble uses; because, there seems to be need for the digesting of the food in the stomach, not so much of heat, as of an active ferment: For Fishes being actually cold, devour their food whole, and without the help of heat, easily concoct the same, being resolved as it were by a certain *menstrum*: besides, it is observed of the Spleen, that though in man its whole substance lyes near to the Ventricle; in most other Creatures, who are indued with a longish form, as to the greatest part of it, it is removed from the Ventricle: Further, if the Spleen be the only Chimny, in which the Blood warming the Ventricle is contained, what is the reason that it, rather than the Liver or Lungs, becomes of a livid or blewish colour, and is stuffed with a black blood, and that less hot?

See his discourse of fermentation. Chap. 5th.

When I consider these things, which sometime since I have observed concerning the use of the Spleen; it seems far more probable, that a certain dreggy portion, *viz.* a matter consisting of an earthly and fixed Salt, is laid up in this Inward, by the Blood carried to it; by the Arteries, which being exalted there as it were by digestion, and into the nature of a ferment, is lastly committed to the blood, flowing from it by the Veins, which inspires or quickens it with a certain leven or fermentation, and performs the same thing about its Spirit, or making it Spirituous, as our ferment commonly called Leven, doth, being put into a batch of bread or dough; for as a certain portion of the unbak'd bread or dough, being kept to a sourness, preserves the same nature that it doth ferment or leven other bread or dough, and stirs up in it the otherwise sluggish Particles into motion; so it seems, that the Blood being laid up in the Milt or Spleen, and there getting a sourness, as it were by stagnation, puts on the nature of a ferment, whereby indeed the rest of the mass of blood, and perhaps the other humours, are actuated, and as it were Spiritualised into a more lively motion. What hath been ingeniously wrote by a late Author, *viz.* the most learned *Velthusius*, concerning the use of the Spleen, may have relation to this: for he hath determined as highly probable, a ferment to be contained in this inward, whereby the sluggish Particles of the blood are brought into a state of activity: Because, taking notice that in children, and others indued with a sanguine temperament, and more fat or dull habit of body, even as their manners and disposition of mind were inclined to idleness, softness, and dulness, so their Spleen was ever of a reddish colour, and full of florid blood, like the Liver: from hence he concludes, that the Spleen doth but little perform its office in these, as the gential parts before ripe age, or in those of weak Loyns; but on

the contrary, forasmuch as men of a middle age, and chiefly in those who are of a severe Countenance, and of a lean Body, as in them appear marks of cunning, sagacity, fortitude, and constancy; so their Spleen is found to be of a livid or blewish colour, and imbued with blood as it were muddy: further he argues from hence, that the blood being kept long in the Spleen, as in a conduit or receptacle, turns plainly into ferment, by which its remaining mass being from thence inspired, is made more subtil, and begets more acute Spirits, both in the vital and in the animal Kingdom or Government: For he supposes our bodies naturally to abound with too much humidity, by which indeed the function of the parts, and many of the *Viscera*, are very much dull'd: but that the Spleen doth communicate to the mass of blood, solid, firm, and constant parts, and not easily to be dissipated; and that those do wipe away that moistness, and with it carry away in some measure that softness from the Blood and Spirits, which is predominate in tender Age, almost after the same manner as the North-wind, or eastern gales, fanning and intimately penetrating the air with the dryness and strength of their parts, breathe health or strength to the Air, and to our Bodies.

But since I have in another place, declared what I have formerly thought concerning the Spleen, there will be no need to repeat it in this: yet I shall further note, that in bodies of living Creatures, compacted out of a quinarie of Elements, as the Spirits ought to be more strong then the rest: so indeed they being intangled with a viscous humidity of Sulphur and Water, are so hindred, that oftentimes they are not able to exercise their strength or powers lively enough; hence saline Particles, for that they are very much fermenting, are required for this, that the spirituous little bodies, almost overwhelmed by the embrace of the others, and stupifyed, might lie awakened, and set at liberty, and into motion. Wherefore we experience in our selves, when the Spirits are dull'd, by the Blood being too much exhal'd, that notable help is brought by sharp Liquors, as chiefly small Wines, and Cider: for these kind of Remedies sharpen the Spirits, and shake off all heaviness. Such a kind of fermenting virtue we easily believe to be continually exercised by the Spleen being in right order, towards the Blood and nervous Liquor.

For as this inward is formed with a threefold sort of Vessels, *viz.* with Arteries and Veins, and besides with great enfoldings of the Nerves, and a most thick contexture of nervous *Fibres*; we think the use of each of them, to be set apart for this end: *to wit*, by the Arteries the blood is carried to the Spleen, hence it lays up its dregs, composed of a fixed Salt, and an earthly matter, in its passages and porosities, and these there laid up, as it were by a certain digestion, are brought into a juice very fermentive: A portion also of which, being carried back to the Blood, by the Veins, is continually mixed with it: and so its whole mass is inspired with those kind of fermentive Particles from the Spleen; by which a certain austerity and sharpness, with vigour of motion, is given unto it; so that for that reason, the Blood it self is carried more lively in the Vessels; also from thence, the nervous juice procreated from the blood, being more active, supplies the animal regiment; But truly, the Spleen doth not only by this means mediately, and by the intervention of the blood, inspire the Brain and nervous stock with a fermentive virtue; but it may be lawfully believed, that this is done somewhat more immediately by the passage of the Nerves, dispersed in the Spleen: For, because in this part Anatomy discovers a great company of Nerves and nervous enfoldings, and of *Fibres* springing from them; it may well be doubted for what use they should serve: Concerning this, it is first to be observed, that the Ventricle and the Spleen have a most intimate commerce with the Brain; insomuch, that *Helmont* did place the seat of the Soul in those inwards; but this is possible to be done by no more commodious way, than by the aforesaid Nerves: Wherefore we may here deservedly suspect, That not only the animal Spirits, are the Messengers between the one part and the other; but also, that the nervous Liquor, which is both the Food and the Ventricle of these Spirits, doth descend now from the Brain towards these inwards, and now being received from these *Viscera's* by the Nerves, doth creep thorow towards the Head; which kind of spleeny Juyce being dilated to the Brain, sharpens the animal Spirits, and raises them up being slothful, and irritates them into quick motions: from whence it is commonly said, the sharpness and sagacity of the mind doth proceed from the Spleen; and splenetick people are accounted ingenious: But it is probable, that the rage and force of the Passions, being begun by the Spirits inhabiting the Brain, are carried to the Spleen by the passage of the Nerves; and so the Spirits there dwelling are pathetically troubled, and the Blood flowing thither is moved into a multitude of perturbations: For from hence it in some measure falls out, that in anger, sadness, and other distempers of the mind, according as the ferment, if the Spleen being more or less moved, is inspired to the blood, its liquor

diversly

diversly boyls up: Further, for this reason it happens, that great Inflations and Commotions of the left *Hypochondrium*, come upon splenetick people from every violent passion.

The reasons of the hypochondriacal symptoms laid open.

These things being thus premised concerning the use of the Spleen, it will be easie according to our *Hypothesis*, to lay open very many of the Symptoms belonging to the *hypochondriack* distemper, and to give reasons for each of them: For when the Spleen is wanting in its office; that is, when it doth not strain forth the melancholy Recrements of the Blood, nor Cook them into a fermentative matter, as we but now observed in Children, and others of a sanguine Complexion, or too Phlegmatick, to happen often; the disposition of the mind is made duller, the body grows fat with idleness; yea and the blood being more sluggish than it ought to be, is apt to stand still within its Vessels, or at least to be less lively circulated: But on the contrary, where the fermenting power of the Spleen is too much exalted or perverted, the blood by that means being more sharp than usual, or made more sower, it runs about rapidly here and there, and conceives irregular motions; yea, and the nervous juice, falling away from its right temper, imbues the animal Spirits with an heterogeneous and an explosive *Copula*, and so irritates them, as it were with goads into frequent Convulsions: as that not wholly undeservedly, many kinds of Diseases may be imputed to the Spleen being out of order: But the ways or means of affecting, whereby the Spleen being evilly disposed, doth produce the Symptoms of the hypochondriack passion, or at least contributes to the rise of them, are chiefly these following.

The Influences of the Spleen in producing the symptomes, unfolded.

First, It sometimes happens, that the spongy substance of the Spleen from the fæces of the blood, being too much impacted in its Pores, and stagnating, is very much stuffed and obstructed: That from thence, it doth not sufficiently receive the Recrements of the bloody mass: But the same being carried thither, but not received, do flow back into the neighbouring branches of the Cæliack Artery, from whence they are presently carried into the Membranes of the Ventricle, the Caul, the Mesentery, and other nigh parts, and are wont to be affixed to them; hence the tone of those *Viscera* are so much spoiled, that they do not rightly perform their due offices about the Concoction of the Chyle, and the Membranes planted every way about, being much imbued with heterogeneous and irritative Particles, for that they are almost continually pulled by Convulsions here and there stirred up; they are grievously obnoxious to wandring pains, contractions, distentions, and the encrease of Winds, by reason of this kind of regurgitation of the blood from the Spleen being obstructed; it is likely, that the pulsation which is felt by hypochondriacks under the Ventricle, is excited.

2. When the fæculencies of the Blood are excluded from the Spleens being obstructed, being fixed (as was said) to its neighbouring parts, they bring forth the sickly distemper of the left *hypochondrium*: But though indeed, that inward sufficiently receives the melancholy or atrabilious juice carried to it from the Blood by the Arteries; yet oftentimes it doth not rightly Cook it, but the Salt being too much excited, it changes it into a too sharp, or acid, austere, or sower, or some other kind of vitious humour; whereby when as the whole mass of blood, and the nourishable juice contained in its bosome, are almost wholly infected, the fruits of the hypochondriack Seeds bud forth thorow the whole body; the blood grows unduly hot, is in some places impetuously moved, and again in others is apt to stagnate or stand still: from hence, it is familiar with splenetick people presently after eating to grow red in the Face, to have the Palms of their Hands hot, their Hypochondria to swell; oppressions of the Heart, and noted variations of the Pulse to succeed: But these fermentative Particles being translated from the Blood every where into the solid parts, wandring pains, running up and down here and there, and a sense of pricking are stirred up in many Members of the Body: Moreover, from this infection of the blood, for that its mass is changed from a benign and balsamick temper, into a salt and tartareous, a lean habit of Body, with a black and dark Countenance is induced.

3. From the Blood being so depraved by the fault of the Spleen, oftentimes the taint is carried to the animal Government; for heterogeneous and convulsive Particles are poured frequently into the Brain, and from thence into the nervous stock; so that the animal Spirits dwelling in either Province, conceive various irregularities; by reason of the evil being impressed on the Head, hypochondriacks use to be troubled with various Phantasms, with an heap and fluctuations of thoughts: besides to them happen frequent *Vertigoes*, Scotomies, Head-aches, and often paralytical Distempers: Then, forasmuch as the morbifick matter slides down from the Head into the nervous stock, convulsive Diseases are excited in very many parts of the body, but chiefly about the *Præcordia* and *Viscera* of the lower Belly; for when the Spirits flowing within the Nerves which respect those parts, are greatly disturbed by reason of the distemper of the mind, the Con-

Convulsive Particles the more readily enter into those Pipes, and more easily impress on those Spirits a convulsive Disposition: Therefore partly by reason of the infection mediately transmitted to the Brain, and partly by reason of the hurt (as hath been shown) immediately communicated from the Spleen, the Palpitation of the heart, trembling and frequent swooning, constrictions of the Breast, impediments of Breathing, pains of the Stomach, Belching, Vomiting, and many other accidents in those inwards happen to hypochondriacks.

4. Besides these inordinations which are wont to be derived by the passage of the blood from the Spleen, into the humours and solid parts, and to the brain it self, and nervous stock; there are other farther evils which seem to arise from this inward, also by the passage of the Nerves: Because, as we have shown, their extream branches, and the nervous *Fibres* themselves, interwoven in the *Viscera*, do drink in with their outwardmost little mouths a certain humour, and convey it sometimes upwards; it is highly probable, that the nervous *Fibres* distributed to the Spleen, (of which as we but now hinted, there is a mighty guard) do receive its most sharp juice, which creeping higher thorow the nervous Pipes, becomes a Cause of convulsive Motions: In truth, that there may be those intimate Commerces between the brain and the Spleen, to wit, far sooner than what can be made, by the compassing about of the blood; it may be lawful to believe, that the nerves of the wandring pair, and the intercostal, to be the neareſt means of the passage, whereby these parts Communicate one with the other, and mutually affect themselves. For it seems that when the black bile or melancholic tumour in the Spleen, grows turgid, or swells up of its own accord, or is moved by some evident cause, its particles enter the nervous *fibers*, thickly distributed to the same, which disturb the animal Spirits flowing in them, into explosions, or at least into some disorder: then the Spirits being so disturbed, infect those next to them, and they others, till by their continued series, the passion begun within the Spleen, is propagated even to the brain, and there produces inordinate Phantasms, such as happen to hypochondriacks; also on the other side, when a grievous distemper of the mind, occasionally excited within the brain, doth disturb the Spirits inhabiting it, the impression being carried to the Phantasie, by the series of the Spirits, planted within the nerves of the wandring pair, and the intercostals, and successive affection, it is brought even to the Spleen; hence its ferment being put more into commotion, stirs up Convlsions, both in that Inward, and in the whole neighbourhood of Fibres and membranes; and besides, forces the blood into ebbings and flowings, and into various æstuations or vehement motions, yea and reflects the perturbations of the Spirits, upon the brain. From this kind of reciprocal affections of the brain and Spleen, it comes to pass, that hypochondriacks are so unquiet, unstable, and fluctuating, at every thing that's proposed, as if, according to the Poet, Ten minds strove in them at once.

1. *Observation.* A certain noble Gentleman, of a melancholick temper, and always accounted for a Splenetic man, very much complained of a pain and inflation of his left hypochondrium, with a frequeut rumbling noise, and sour belching, also of a trembling of the heart; of an assiduous vertigo, too much waking, and a disturbed phancy: About the 35th year of his age, the disease growing worse, he began hardly to sleep, and yet more rarely to get it at night, and to be molested in the day-time with a world of fluctuating thoughts, to have in suspition all things and persons, and greatly to be afraid of every object: His *Præcordia* seemed to be very much bound and straitned, and to sink down to the bottom, as if the heart it self were depressed even into the belly; which Symptom troubling him, he became very sad, and dejected in mind: yet afterwards, those distempers of the mind remitting, he felt with it his heart to be a little lifted up, and also his *Præcordia* to be loosned, and stretched forth; besides, he very often sustained Pains and Contractions, variously excited, about the Muscles of the *Viscera* and Members, and running up and down here and there.

As to the nature of the disease, it is plain, that it is this kind of Distemper which is commonly called hypochondriacal: but as to what respects the causes of these to be admired Symptoms, we may suppose the mass of blood being degenerate, and stuffed with melancholick or atrabilary fæculencies, to administer or continually to suggest its adust recrements to the head; from whence the Liquor watering the Brain and Nerves, being made sharp, and improportionate to the Spirits, did stir up the containing Bodies, into painful Corrugations, or Wrinklings, and Contractures: Further, when this Infection is chiefly derived from the Head, into the Nerves of the wandering pair, and the intercostal, the Brain and the *Præcordia* are very much punished by the malady from thence raised up. But that the Blood is depraved by that means, it seems to be imputed to the vice of the Spleen, forasmuch as this inward, being amiss, it did not rightly strain forth the atrabilarie dregs from the blood, but ra-

rather did more pervert whatſoever recrements it received from it, and the ſame being exalted into an hurtful ferment, ſent it back to the blood, and ſo very much infected its maſs, and imbued it with a plainly acetous and vitriolick evil Diſpoſition.

It is plain to be underſtood, that thoſe ſymptoms troubling the Head, *viz.* too much waking, the *Vertigo*, a diſturbed Phantaſy, with many others, did proceed from the heterogeneous Particles poured forth from the Blood into the Brain: As to that ſtraitneſs of the Breaſt, and falling down of the heart with great fear and ſadneſs; it may be thought that the nervous *fibres*, inſerting to the heart, and chiefly to the *Pericordium*, being moved into Convulſions and wrinklings, do bind hard thoſe parts, and pull them downwards; wherefore, there is perceived in the whole breaſt, as it were a certain conſtriction, and the heart it ſelf ſeems to be depreſſed: Further, foraſmuch as the *Præcordia* being ſo ſtraitned and depreſſed, the blood within the boſom of the heart is ſtop'd and compell'd, as it were, to ſtagnate, both the vital and the ſenſitive Soul is much hindred from its wonted expanſion and irradiation, and for that Cauſe being leſſened and ſhortned in its conſtitution, thoſe Cruel diſtempers of fear and ſadneſs ariſe; but when the Convulſions remitting, that conſtriction of the heart, and its *appendix* is releaſed, the Soul alſo, as a flame more expanſed or enlarged, endeavours by little and little to ſhake off the Chains of theſe Paſſions. For the Cure of theſe Diſtempers, he had for a long time tried very many remedies, and medical Adminiſtrations, but without much benefit; at laſt he was ſomewhat eaſed by the uſe of Spaw-waters, and from thence by degrees finding himſelf better, he became free from thoſe grievous Symptoms; however, he ſtill liv'd obnoxious to the *hypochondriack* Diſtemper.

2. *Obſervation.*

A certain young Academic, orginally of a Sanguine temper, fair, of a flouriſhing Countenance, excellent Diſpoſition, and Mild, by reaſon of immoderate and untimely Studies, in the mean time exerciſe and good order of dyet being wholly neglected, had contracted an obſtruction of the Spleen, or ſome other morbid diſtemper of that Inward: For he had almoſt continually infeſting him an inflation, and tumor of the left *hypochondrium*, with a moſt heavy *Pain*. After he had laboured with this ſort of Diſtemper about half a year, he began to complain of a frequent giddineſs, a blindneſs of his eyes, an unquietneſs of his mind, and of diſturbed ſleeps: Which Symptoms were then plainly imputed to vapours ariſing from the Spleen: but after that followed a trembling of the heart, with a frequent *deliquium* of the Spirits, a pulſation of the *hypochondrium*, and at length Pains and Contractions in the outward members, with a frequent ſtupor, and a ſenſe of pricking, running up and down here and there: and laſt of all, being broken with a world of evils, contrary to his *genius* and native Diſpoſition, he became greatly hypochondriacal.

That I may diſpatch the Pathologie of this Caſe in a word, it appears here plain enough, that the Spleen was firſt of all in fault; by whoſe fault, when the bloody maſs was depraved, the taint creeping from thence into the humour watring the brain and nervous ſtock, and infecting it, did induce the aforeſaid Convulſive Symptoms.

The Method of Curing the Hypochondriac Diſtempers.

The Curatory Method to be uſed againſt the hypochondriacal Diſtempers, requires chiefly theſe four general Indications, *viz.* In the firſt place, that the Impediments of the Cure may be taken away, the Intention of which chiefly reſpects the purging and preſerving the firſt paſſages. Secondly, it muſt be endeavour'd that the obſtructions of the Spleen may be corrected. Thirdly, that both the recrements of the bloody maſs may be purged forth, and that its due diſpoſition may be reſtored. Fourthly, and laſtly, that the enormities of the brain and nervous ſtock, and alſo of the watering humour, and the inhabiting Spirits, contracted by the fault of the Blood and Spleen, may be amended, or taken away: when any of theſe Intentions, or all of them together, ſhall be endeavoured at, fit times ſhould be choſen, in which each being ſingly propoſed, may be performed without any neglect or hindrance of the reſt.

1. As to the firſt Indication, when a great load of crude or aduſt matter is wont to be laid up in the firſt paſſages, and when the tone of the Ventricle us'd to be ſpoiled, and its ferment variouſly perverted againſt every one of theſe kinds of evils, you muſt bring timely help with fit remedies; therefore, gentle and moderate evacuations, both by Vomit, if it proſpers well, and by Stool, ought to be adminiſtred: For ſuch whoſe ſtomach eaſily caſts forth its contents upwards, I perſwade, that once in a month Vomiting ſhould be ſeveral times provoked by taking *Liquor of Squils*, or *Salt of Vitriol*, or by drinking plentifully ſmall beer poſſet-drink, or warm water; in the time between, a gentle purge, and only a little moving is to be ordered often: For this end, The Pills *Tartareous* of *Bontius*, or Stomach-pills with Gums, or our ſolutive extract,

tract may be of use. Take of the best *Senna* one Ounce; of *Rhubarb* ʒvi, of *Epithim* ʒiii, of *yellow-Sanders* ʒii, of the *Salt of wormwood* ʒii, of *Celtic Spike* ʒi, being cut and bruised, let them be digested in x ounces of *White wine*, and as much of fumitory water, for 48 hours, let the clear straining be evaporated with the heat of a gentle bath, to the consistency of an extract, adding towards the end, of the powders of *Senna*, of *Rhubarb*, and *cream of Tartar* each ʒii, let them be bruised together in a glass mortar, and reduced to the consistency of Pills. The Dose ʒß, ℈ii, or ʒi, the Remedies respecting the tone, and ferment of the ventricle, as they are manifold and divers, out of them the most fit or commodious for the Disposition of the Ventricle, are to be chosen; for to this bitter things, to that Saltish, to another sharp and perhaps biting things, are desirable. Among the number of these kinds of Medicines, (which are commonly called Digestives) are *Elixir Proprietatis*, *Tinctura Sacra*, *powder of Aron* Compound, *Salt of Wormwood*, *Cream of Tartar*, *Tartar vitriolat*, *Vitriol of Steel*, with many others. Besides these inward Remedies, also external applications do often bring help: Because the Stomach being ill affected, a fomentation of *white-wine*, with *wormwood*, *century*, and other bitter plants boyled therein, also oyntments or plaisters, often bring help: Concerning which, there will be no need here to discourse particularly, and to prescribe forms of the Medicines themselves.

2. The second Indication, for the mending the vices of the Spleen, (to wit, if there shall be in the same any obstruction, Tumor or Pain, or simple Dyscrasie or Intemperament) is wont to be performed, or at least attempted by Remedies both internal and external: Those which are of the former sort, fall in with those indicated in the 3*d* place, (to wit, with such, as for the purifying the Blood is intended) because, when chiefly, or almost all that which is carried or born to the Spleen, is done by the passage of the blood, the irregularities of the *Latex* of this, as well as of that Inward, by a Social labour, ought to be cured with the joynt strength of Medicines; by what means is shown by and by. In the mean time some external Applications, under the form of a plaister, or an oyntment, or a fomentation, more nearly and immediately respect the body of the Spleen, and often bring notable help, forasmuch as they discuss tumors, and allay the Convulsive Distempers, and quiet them. Great plenty of these kind of outward Medicines, are every where extant among Authors, the choice of which ought to be made, according to the various passions of the Spleen, or the divers Constitutions of the Patient, so that there will be no need here to shew their particular forms.

3. The Remedies indicated in the 3*d* place, to wit, which take away the dyscrasies or evil temper of the blood, contracted from the vice of the Spleen, and also clear the primary fault of the Spleen, are of a manifold and divers kind and manner, the choice of which ought to be administred, according to the various infection of this or that: of these, some are compounded and prepared according to the prescription of Physitians, as *Electuaries*, *Powders*, *Apozems*, *Tinctures*, *Infusions*, and the like; others more simple, as *whey*, *asses milk*, *Spaw-waters*, and *Baths*.

There are two chief Cases of sick people, in which magisterial Remedies ought to be all accommodated, according to their strength and qualities: to wit, either the blood is thick, coldish, and earthy, with the Spleen being obstructed, which requires more hot fermenting, and chiefly Chalybiate Medicines; or the blood being clearly adust, and hot, ferments too much, and together greatly troubles the *hypochondria*, and in them the blood and humours boyl up; in which state, Remedies only temperate, and allaying the fermenting, and immoderate boyling of the humours, are to be chosen, where Chalybiates are wholly to be avoided.

When therefore to a cold ventricle, cold dyscrasies or evil temperaments of the Blood and Spleen also happen, I am wont to prescribe according to the following forms.

Take of the *Troches of Rubarb*, of the *Powder of the root of Aron*, of *winteran Bark*, each ʒii, of the *root of virginian Snakeweed*, *Centrayerva*, *Diatrion Santulon*, of *Crabs eyes*, each ʒi, of the *extract of Gentian*, of *Century*, each ʒiß, of *ammonia*, dissolved in the water of *Earth-worms*, what will suffice to make a mass of Pills: let them take 4 pills in the morning, and at 4 a clock in the afternoon, drinking after them a little draught of *wormwood wine*, or *chalybiate wine*, with moderate exercise.

Take of the *Conserves* of the *yellow of Oranges*, and of *Lemons*, each three Ounces, of preserved *mirabolans*, *n.* ii, of the *Species* of *aromaticum Rosatum*, of *winteran Bark*, each ʒii, of the *Salt of wormwood* ʒii, of the *vitriol of Steel* ʒi, (or *Steel prepared* ʒiii.) with what will suffice of the *Syrrop of Citron rinds*, make an Electuary, to be taken twice a day, drinking after it a draught of *wormwood-wine*, or of the infusion of the *herb* or *flowers* of *Tamarisk*.

For

For those who are not pleas'd, but with medicines in an elegant form, and in a very little quantity, the tinctures of *Antimony*, and of *Corrall*, also of *Steel*, with the *Spirit of wine*, (the body being first dissolved by a proper *menstrum*, and reduced to a *Calx*) are convenient: as also the *Spirits of Sut*, of *blood*, or of *harts-horn*, to be taken twice a day, with a proper liquor to 12. drops, more or less, are of known benefit, above any other medicine that I know of: moreover the often drinking of *Coffee*, also that made of the Infusion of the leaves of *Thea* gives ease to some.

If that the fervor of the blood, and too fermenting, with the trouble of the Spleen, and unquietness of the mind, be joyned to the hypocondriac Distemper:

Take of the *Conserves of hyps* or *Conaradine*, six Ounces (or of the flowers of *Tamarisk*, and the leaves of *wood-Sorrel*, each three Ounces) of the *Species* of *Diarrhodon Abbatis*, of the confection of *Alkirmis*, each ʒi. of the *powder of Ivory* ʒß, of *Pearls* ʒß. of the *Salt of Tamarisk*, and *Wormwood*, each ʒi. with what will suffice of the *Syrrop* of *green Citrons*, or *Clove-Gilliflowers*, make an Opiate, to be taken twice in a day, the quantity of a Nutmeg.

Take of the *Powder of Ivory*, ʒii. of the *Powder of Pearls*, ʒi. of the *Species* of *Diarrhodon Abbatis*, of *Diamagarit frigida*, each ʒiß. make a fine powder, add of *white Sugar*, dissolved in *Baume-water*, and boyled to the consistency of Tablets, Six Ounces; make thereof, according to Art, Lozenges, or little cakes: take ʒiß or ʒii twice a day. To these, and other medicines of this nature, may be joyned the use of Spaw-waters, which indeed in either, yea, in all cases of hypochondriac Melancholly, are almost always taken with good success: For want of those waters, our artificial Spaw-waters may be conveniently ordered, yea, and whey; and if any notable atrophie be, let Asses milk be daily taken.

Besides, these inward Remedies, and other outward Applications before-recited, *Phlebotomie*, or the taking away of blood with Leeches from the sedal veins, may be of use frequently: yea, sometimes it may be convenient to open the Salvatella Vein, according to the prescript of the Ancients: Besides Cauteries, or Issues, which may continually carry forth the adust recrements of the blood, and by degrees excern them, are wont to be beneficial almost to all.

4. The fourth Indication, respecting the affections of the brain, and nervous stock, or the Convulsive Symptoms, having relation to, or coming upon the former, is rarely in use of it self, and apart from the others, but that Remedies destinated to this end, are complicated with those abovesaid. Liquors indued with a volatile Salt, or ammoniac, as *Spirits of Harts-horn*, and *Sut*, are highly necessary for this intention, as also the rest but now recited; wherefore such Remedies, unless any thing shall shew the contrary, may be daily given at fit hours. Further, when Spaw-waters are drunk, let tablets or pills, such as are above prescribed for the Convulsive distempers, be taken, at least twice in a day. In the frequent turning and giddiness, also in the passions of the heart, the sinking down of the Spirits, with dread, and as it were a fear of Death just seizing on one, I have known very often great help to be had by the use of Chalibeat, or steel Medicines.

The preparations and effects of Steel Medicines unfolded.

Since we have made mention so often of Chalibeat, or steel medicines, it will be worth our while to enquire into their various preparations, and for that Reason their divers manners of effects, which they are wont to produce in the humane body, that it may from hence appear by what means, and for what respects these or those preparations of Iron are greatly profitable to some hypochondriacks, and to others as much hurtful.

The virtue and operation of Chalybeat, or steel'd medicines, depends upon the particles of the concerts, being after a various manner dissolved, unfolded, and brought forth into act: For Steel, or Iron, consists chiefly of a *Salt*, *Sulphur*, and *Earth*; and but slenderly indued with Spirits and Water: But the particles of the former Elements, chiefly the sulphureous and saline, being in their mixture combined together, with the Earth, remain altogether fixed and sluggish; but being soluted, and pulled one from another, they come to be of a very efficacious Energy.

The aforesaid particles are dissolved in a twofold manner, and set into the Liberty of acting; *viz.* either by Art, whilst Medicines are prepared, or by Nature, after they are taken inwardly; for the metallic Body is wont to be dissolved and eaten by the ferment of the ventricle, just like a Chymical *menstrum*: We will consider the several *Species* of either, and their manner of being made, that it may appear what alteration is impressed on the steeled Medicine in the preparation, and what effects every preparation of it doth impress on man's Body.

The most simple way of preparing Iron, is a division of its body in to little integral parts with a file, which resemble the nature of the whole mixture, and contain both

little sulphureous bodies and saline, combined among themselves, and with other terrestrial. The filings of Iron being inwardly taken, is dissolved by the ferment of the ventricle, as it were by an acid *menstrum*; the signs of which are both a sulphureous and unsavory belching, as from the eating of hard Egs, also the blackness of the ordure, from steel being dissolved within the *Viscera* of Concoction, active particles, both sulphureous and saline, plentifully sally forth, and being involved with the nutricious juice, are carried into the blood; which as they excel in a divers virtue, do often conspire, as it were, with the joynt forces of either, to bring benefit to the sick. The sulphureous little bodies being brought to the blood, add to it a new and more plentiful Provision of Sulphur; wherefore its mass, if before it was poor and liveless, doth nimbly ferment within its vessels, and being inkindled farther in the heart, acquires a more intense heat, yea, and a deeper colour; for it is so observed in many affected with the Dropsie, arising from white Phlegm, the Pica or evil longings, or green-sickness, to have a pale countenance, cold blood and waterish; but by the use of steel, the countenance soon to be more florid, and the blood to be imbued with a more intense tincture and heat: moreover, from the filing of Iron dissolved in the ventricle, also saline particles are brought forth, and often they bestow a more plentiful fruit or increase both on the solid parts, and on the humors; for since their natures are vitriolick, and stiptick or binding, they bind togetherand, strengthen the too lax and weakned *fibres* of the *Viscera*, and so restore the broken tone: Besides, these saline particles inhibit the force of the blood, repress it from too much heat and boyling up, and froth, and retain it in an equal circulation: Besides (which is their chief virtue) they contract and straiten the too loose, open and gaping little mouths of the Arteries, that, for that Reason, neither the *Serum*, nor the bloody *Latex* may sweat out, or be broke off from the file of its circuit: Wherefore in the Dropsie, and great bleedings, Remedies, imbued with the saline particles of Iron, are of famous and efficacious use; for very many Diseases proceed from this cause; forasmuch as the little mouths of the Arteries being too open, and the interspaces of the vessels above measure loosened, the *serum*, or bloody *latex* breaks forth; which kind of Affections the Vitriolic Particles of Steel do often help, by binding and corroborating the sanguiferous Vessels, and nervous *fibres*.

After this manner the *filings of Steel* being taken inwardly, seems at once to add to the blood both spurs and a bridle. But forasmuch as from this Medicine an incitation, much more than a restriction, doth arise, therefore it ought to be given only to them whose blood is very thick and cold, as countrey people and strong persons; in very hot and spirituous blood, and in hot inwards 'tis no ways convenient: moreover in delicate persons, and men of a more tender constitution, 'tis dangerous, lest the little portions of the steel, when they cannot be sufficiently dissolved, should like fragments of glass, be driven into the membranes of the *Viscera*, and there pertinaciously sticking, produce some Ulcer, or deadly torments, which indeed I have known sometimes to happen.

2. After the filing of Iron, the next way of preparing it, is calcining it with Sulphur; to wit, let thin pieces of steel, being strongly fired, be laid upon a Roler of *Sulphur*, that the metal may melt into little round balls, which are to be calcined to the consumption of the Sulphur, and pounded in a mortar, are to be reduced into a subtle powder, which is of choice use. In this preparation of Iron, some salphureous particles are exhaled, the sign of which is, That this powder, an acid liquor being poured upon it, much less boyls up, or grows hot, than the limature or filing of Iron: but being taken by the same mouth, it excites a sulphureous savour. In the mean time in this preparation the saline particles seem to be somewhat augmented by new ones sticking to them, from the metal burning with sulphur; so that active particles of either kind, to wit, sulphureous and saline, come almost to an *Æquilibrium*: and when by this means this medicine, the substance of the metal being loosned, may be finely poudered, it becomes of far more excellent use than the filings of Iron: In most Cases where steel ought to be given in substance, as in a Cachexie, or a fulness of evil humors, the longings of maids, or the green-sickness, and such like, this medicine is convenient to be used.

3. In the third place follows the preparation of steel with vinegar; to wit, the filings of the whole steel is moisten'd with vinegar, and dried, till it may be reduced into an impalpable powder: In this preparation the sulphureous particles are yet much more; yea, as to the greatest part evapourated, only a few being left in the mean time, the saline, by reason of others sticking to them from the vinegar, are much encreased, which are mingled with the terrene particles: This chalibiated powder very little or nothing froths or boyls up, a sharp liquor being sprinkled upon it, also being taken at the mouth, has with it scarce any sulphureous savour: wherefore it conduces less to the taking away of the obstructions of the Bowels, or to the restoring the ferment of the

the blood: nevertheleſs in a more hot Conſtitution, in hemorrages, or fluxes of blood, and the hypochondriac diſtemper, it is wont to be adminiſtred with greater ſucceſs than the former preparations.

4. Follows the Ruſt of Iron, which being an extract of the metallic body, ſeems to be, as it were, a fifth Eſſence; becauſe in this excreſcency ſome particles of every kind, to wit, ſulphureous, ſaline, and terrene, being looſned from the whole ſubſtance, are combined among themſelves, and conſtitute, as it were, a new mixture, more ſubtle and defæcated, or clearer from dregs: For that in this concrete there remains leſs particles of ſulphur; therefore it doth not ſo potently ferment the blood, or take away the obſtructions of the *Viſcera*, as ſteel prepared with ſulphur, but in more hot diſtempers of the parts or humours, it egregiouſly performs the requiſite intentions of a ſteeled Medicine.

To this Claſs may be referred by right, our preparation of ſteel, to wit, in which all the particles of the metal being looſned from the bond of mixture, are contained together; which notwithſtanding (the concrete being firſt reduced into powder) and immediately diſſolved in any Water or Menſtruum: This powder being inwardly taken, hath the like vertue as ſteel prepared with ſulphur; but to the liquor or menſtruum in which it is diſſolved, it imparts almoſt only ſaline, or chiefly vitriolick particles, the ſulphureous flying away, and the terrene ſinking to the bottom. I am wont to give in great quantity, and not ſeldom with excellent ſucceſs, common water impregnated with the diſſolution of this, inſtead of the natural acidulous or ſpawiſh waters: moreover I make thereof medicated wine, beer, cyder, whey, or other Liquors, this powder being diſſolved in them; and preſcribe them to be taken for ſeveral intricate intentions. So much for the preparations of iron, in which the elementary particles of every kind are comprehended in a various proportion: There remain others in which the particles almoſt only of one kind, to wit, the ſaline or earthy are left; the reſt, as to the greateſt part, being driven forth; of which ſort are chiefly vitriol, or the Salt of ſteel.

5. For the making the vitriol of ſteel, firſt, the metal is wont to be eaten thorow with a very ſharp and corroſive Liquor, and to be diſſolved into elementary parts: In the diſſolving, the ſaline particles of the menſtruum are joyned to the other ſalines of the Iron, and are with them intimately combined; in the mean time, the remaining ſulphureous and terrene being laid aſide, and excluded from their company; then common water being poured to this ſolution, the ſalts of either kind being combined, are imbibed by the Liquor, and that being laſtly filtrated and evaporated, they are reduced into chriſtals. This kind of making of ſalt or ſalification, ſucceeds, if you do it either with the Spirit of vitriol, the oyl of ſulphur, or ſtygian water, or any others diſtilled from the ſtagmas of minerals: Yea, *Sal Armoniac* only, being ſoluted by melting, diſſolves Iron after the ſame manner, and cauſes it to chryſtalize.

Salt of Steel thus prepared, hath a ſweetiſh taſte, with a certain ſharp ſtipticity or binding, and participates much of the Nature of *vitriol*, that it ſeems not to differ much from Verdigreaſe. Taken inwardly for a medicine, it ſomewhat ferments the humors, and powerfully binds the nervous *fibres*: for cold Cachecical and Phlegmatic people this medicine is not convenient, becauſe there are in it no particles of *Sulphur*; but it is often adminiſtred with ſucceſs in hot diſtempers of the bowels, where there is a predominancy of aduſt *Sulphur*, and in wandring effervеſcencies, in ſcorbutical and unequal heats both of the blood and nervous ſtock by it ſelf, or mixed with other medicines as an enforcement: but yet in more tender Conſtitutions 'tis dangerous, leſt the tone and *fibres* of the ventricle ſhould be hurt by its acrimony, and too great conſtriction or aſtringency.

6. In the laſt place follows the aſtringent *Crocus Martis*, or the *Crocus of Steel* prepared by fire through a long Calcination; *viz.* The filings, the off-ſcourings, or thin plates of Iron, ſhould be ſo placed in a reverberating furnace, that they may be continually heated by a moſt ſtrong flame: The filing being thus expoſed to the naked fire, firſt of all it grows reddiſh, and runs together into little hard round balls; but after Three or Four days, ſwelling up ſuddenly into an higher heap, it becomes extream light, impalpable, and of a moſt curious purple colour: In this preparation the ſulphureous and ſaline particles, whilſt by the force of the fire they begin to come away from the concrete, do mutually take hold one of another, and ſo being combined together, grow into little balls; but afterwards thoſe particles, both ſaline and ſulphureous, being wholly profligated, and fiery particles ſucceeding in their place, the whole maſs ſwelling up into a bulk, and made, as it were ſpungy, becomes moſt light.

A Medicine thus prepared in ſome caſes is of moſt excellent uſe, and ſecond to none of the Chalybeats; to wit, almoſt in all extravaſations, or too great eruptions of the *Serum* and blood, as in outward *hæmorrages*, or in inward bleedings, in the *Diarrhæa*,

the *Diabatis*, and in a vehement Catarrh; also I have known no Remedy better than this in the *Ascitis*, or in the beginning of a Dropsie: and this also I have heard to be highly approved of lately by a most famous and expert Physitian of our own Country: Concerning which medicine notwithstanding since it is wholly destitute both of saline and sulphureous particles, and consists only of earthly and fiery particles, it is very ambiguous by what faculty it operates, and produces so praise-worthy an effect in man's body: for there seems to be in this left no more *caput mortuum*, or dead head, or *terra damnata*, than in vitriol, or in any of the other metals distilled by a most intense fire. As to this, if I may conjecture, it seems first, that to this preparation some activity is due, whereby it exerts it self, and unfolds its verrues, either by shutting up obstructions, or by binding together the vessels or nervous *fibres* of the *Viscera*, from the fiery particles shut up in the most fixed earth, and from them breaking forth within the body: But the chiefest Reason of helping, consists in this, That the earthy particles, the saline (by which they were strictly held) being wholly gone, desire greedily to be reunited to them, or such like: Wherefore this *Crocus martis* being immersed in our bodies, snatches to it self whatsoever Salts it meets with, and intimately binds them; and so while it sucks up like a spunge, very many saline particles, it takes away many enormities arising chiefly from the flux of the Salts. By this means *burnt Harts-horn*, *Spodium* and *Antimony Diaphoretic*, when they bring help, exert or put forth their Virtues.

CHAPTER XII.

Of the Convulsive Cough and Asthma.

An example of a Cough meerly Convulsive.

THE History before related, doth clearly manifest, That sometimes a Cough may be caused without any great fault of the Lungs, by reason of the sliding down of the morbifick matter upon the pneumonick Nerves, or those belonging to Respiration; to wit, where it was shown in the Case of the Noble Virgin labouring with Convulsive fits, and also with a grievous and continual giddiness, that when by the prescript of the Physitian, a fomentation of Cephalic Decoction was applied to her head, presently the Giddiness ceas'd, and in its place follow'd a great Cough without any spitting, but night and day, almost, perpetually troubling her; which without doubt hapned by reason of the Convulsive matter being driven from the brain into the beginnings of the nerves: This kind of example of a Cough meerly Convulsive, more rarely happens in persons of ripe years, as the like distemper I have not often seen: But in children 'tis usual (also sometimes I have known it in men) for a Cough to arise from a serous Colluvies overflowing the Lungs; which when at first it was simple and moderate, afterwards it became vehement and convulsive; so that in coughing, the *Diaphragma* being drawn upwards, and held in a long *Systole*, or frequently repeated, the Lungs being greatly straitned, were much hindred in their motion. In the mean time, by Reason of the breathing being hindred, and the blood being restrained within the *Præcordia*, and for that cause stagnating in other places, the sick were in danger of being choaked, and often acquired a livid or dead countenance. But in this Case, besides the Convulsions raised up about the *Præcordia*, by the force of coughing, the Ventricle also being oft brought into a consent, cast forth by vomit whatever it contained in its bosom: yea, and I know in some tender ones after this manner affected, the Disease wandring from thence into other parts, did raise up Convulsive motions in the face, eyes and limbs, and at length became deadly. This kind of Convulsive Cough is very frequent among children, and some years lays hold on so many, that it seems to be plainly Epidemical; when it roots it self, it is very difficult to be cured by Remedies; yea, often being long protracted, it is hardly otherwise to be cured, but by the state of the year being changed.

This distemper frequent enough in children.

The reason of it.

If the causes of the aforesoid Case be enquired into, it will be so plain to refer the procatartic or more remote cause to the redundancy of the serous humour in the bloody mass, and in some sort in the whole body; a portion of which matter dropping forth from the little mouths of the Arteries on the Lungs, creates the ordinary Cough; afterwards when the serous Colluvies, or heap of waters yet exuberating in the blood, and stuffed with Convulsive particles, is also heaped up within the head, the same entring

tring the pneumonic nerves, increases the simple into a Convulsive Cough: For when those nerves, being irritated first about their extremities, are exercised above measure, for that Reason they more easily imbibe the convulsive matter laid up nigh their beginnings: and so when at length they are driven into irregular motions in two places, to wit, in the head and at the tale, and that for two distinct causes, *viz.* from the irritation of the Spirits, and from their explosion, it is no wonder if the Cough at first common, being afterward brought into this evil state, becomes so cruel and convulsive: Moreover when it sometimes happens that the same matter heaped up in the head, does enter some other nerve, therefore Convulsive passions of another manner, often come upon the Convulsive Cough.

The Convulsion Asthma.

Having shown after this manner, That a Cough doth arise not only nor always by the fault of the Lungs, but sometimes from a solitary Convulsive cause, but oftener superinduced by this on a pneumatic Distemper: also we do not doubt to determine almost the same thing concerning another certain Distemper of the *Thorax*, to wit, the *Asthma*: For whether this Disease be continual or periodical in either case, the Symptom chiefly urging, is difficult breathing; which indeed seems to be excited for this Reason, because the Lungs being too much inflated and distended, extreamly fills the Cavity of the *Thorax*; neither do they fall down as they should do by turns: hence the spirit or breath remaining within, is not sent forth freely enough, neither indeed can fresh air be easily induced, by reason the space is before filled: whilst the Lungs are so longer contained in a continual or very little remiss Diastole, oftentimes the *Diaphragma* is urged contrary to its manner, into a violent Systole, and being drawn upwards, is wont more and more to lift up the Lungs, and to hinder their falling down; whereby it comes to pass, that Respiration becomes yet more difficult and more laborious.

Sometimes it depends of the Lungs, together with the nerves being affected.

We easily believe, that this kind of hard breathing Distemper, doth sometimes happen by the fault of the Lungs, because anatomical Inspection hath plainly detected it: For if a great serous Colluvies being laid up in the *Thorax*, very much stuffs the Lungs, and so much obstructs their pores and passages, that the blood being hindred in its Circuit, cannot freely pass thorow the Pneumonic Vessels; for that Reason indeed such like anhelous Distempers are sometimes made: Then as often as the blood growing more hot and rarified, by exercise, or the heat of the bed, requires a larger space for its Circulation within the Lungs; then presently from such an occasion a more frequent Respiration, or an asthmatical fit is stirred up: If beside this morbid Disposition of the Breast, the Sanguineous mass also abounding with a serous water, should be apt to sudden fluxions and effervescencies of the Serum, from hence also, by reason of the violent course of the Serum growing hot into the Lungs, being before obstructed and greatly filled, very often most grievous assaults of this Disease, and almost suffocating do happen. Moreover, sometimes beside the Roots of the Asthma (as it is said) being fixed about the *Præcordia*, certain shoots of the same Disease budding forth from the head, meet with the former, and being complicated with them, produce the more cruel fruits of the *Dyspnæa*, or want of Breath. For because the Lungs being stuffed with *Serum*, another quantity of the same, more largely redounding in the blood, being imbued with Convulsive particles, is poured on the head, the same more readily entring the pneumonic Nerves than others, causes the *Asthma* of the *Thorax*, at first simple and moderate, to become periodically vehement and convulsive.

Of these kind of Distempers, *viz.* the *Dyspnæa*, being excited by the singular fault of the Lungs, and with a Companion, very many instances and examples have fallen under our Observation, and do almost daily happen. For there is nothing more usual than for those that are sick of an inveterate Cough, or any other evil disposition of the Lungs, at length the Dropsy or Scurvy hapning to become Asthmatick, to wit, when the Blood being made much more impure, lays up also its serous dregs in the head, these more readily, and indeed more easily enter than others, the pneumonic Nerves, as being weaker and often irritated near their extremities, and in them do heap up matter for a Convulsive *Dyspnæa*.

An Asthma sometimes meerly convulsive, proceeds from the nerves only being affected.

Further, sometimes I have observed most grievous fits of an *Asthma* to have hapned without any notable fault of the Lungs; so that truly I did think that this disease was sometimes meerly Convulsive, and its fits only excited, because the serous Colluvies or watery heap, being stufft with explosive particles entring into the Nerves, performing the Diastole of the Lungs, grows to the Spirits therein flowing, which being afterwards struck off together, and for a long while, by reason of plentitude or irritation, the Lungs are detained, as it were, inflated and stiff, so that they can perform neither the Offices of drawing in, or of breathing out: But the fit being finished, a free and equal Respiration follow'd, as before the fit began, and no Cough, or signs of a sickly disposition of

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the Lungs did appear. As I have obſerved this kind of *Dyſpnæa* or difficult breathing meerly Convulſive, to have hapned in many, I will here ſhew you one or two hiſtories of it.

A certain ſtrong and fat Gentleman having uſed for ſome time a more full and inordinate Diet, without any exerciſe, began to be ill about the beginning of the Winter: at firſt he was troubled with a pain and heavineſs of his head, with a great giddineſs and fear of ſwounding, and believing himſelf juſt about to die, being otherways healthful; within a few days theſe Symptoms paſs'd into an apparent *Stupor*, or rather Lethargy: he being let blood in his Arm, I cauſed carefully to be applied Cupping-glaſſes, Veſicatories and ſharp Clyſters, with many other Remedies: In the ſpace of 42. hours coming to himſelf, he was ſenſible, and ſhook off all torpor or drouſineſs. But altho his brain was cleared, yet he was taken with a great weakneſs and numbneſs in his members, which diſtempers however were ſhortly cured with antiparyletic and antiſcorbutic Remedies: But after a fortnight he began again to complain of an heavineſs and giddineſs in his head; then the next day after he fell into an horrid *Aſthma*; that the Lungs being ſuddenly inflated, and endeavouring to come upwards, the Breath, which was very quick and laborious, was hindrod, and not being able to come forth, he was in danger every minute of an hour to be choaked. This fit, as it was cruel, ſo it paſs'd over within Twelve hours, without any ſpitting, cough or vomit; and then, within a weeks ſpace, he loſt all the trouble of his breaſt; but then the like fit of the *Dyſpnæa*, or difficult breathing, returning, exercis'd him ſomewhat more gently; and afterwards he was wont to be troubled with ſuch a fit of the *Aſthma*, nigh to the great mutations of the Air, chiefly in great cold, or falling of Snow.

2. *Obſervation.* I knew another Gentleman, ſick of an inveterate Scurvy, who having no manner of Cough, was troubled now with a great head-ach, and for many days with a giddineſs or *Vertigo*; then at another time, being free from thoſe Symptoms, he was taken with a moſt cruel fit of the *Aſthma*; and he endured theſe Diſtempers, now this, now that, frequently, but eſpecially about the greater tropicks of the year.

The Reaſon. It is not to be doubted, but in the aforeſaid Caſes, thoſe fits of the *Aſthma* did wholly depend on the convulſive matter being fallen into the Nerves, ſerving to the ſtretching forth of the Lungs, which cleaving to the Spirits, and being by them ſtruck off, or exploſed, by reaſon of plentitude and irritation, cauſed the *Præcordia* to be lifted upwards, and, as it were, inflated, and by that means hindred from its reciprocal motion.

An Aſthma ſometimes excited by reaſon of the Bronchia being convulſively affected. Moreover we ſuppoſe, that ſuch a kind of Convulſive *Dyſpnæa*, or difficult breathing, is ſometimes excited by reaſon of the *Bronchia* of the *Trachea* (or the ſharp Arteries of the Throat) being too much much ſtreightned, and often almoſt drawn together: We have ſhown in our diſcourſe of the Nerves, that very many branches of nervous *fibres*, and of the Nerves, do every where embrace all the tamification of the aſper Artery, and bind them about; which Nerves, if it happen that they being poſſeſſed by the morbifick matter, ſhould be irritated into frequent Convulſions: for that Reaſon it follows, that the channels or paſſages which they compaſs about, muſt be greatly bound together, and in ſome places wholly ſhut up.

3. *Obſervation.* There was a very choice Virgin, of a tender conſtitution, and of a flouriſhing countenance, ſcarce paſt the ſecond luſtre of her Age (*i. e.* about Twelve years old), that began to be grievouſly tormented with *Aſthma* fits; and before ſhe was entruſted to my cure, ſhe had liv'd obnoxious to them at leaſt Four years: ſometimes ſhe remained free from any fit of this diſeaſe for two or three months: yet oftentimes, by reaſon of errors in Diet, or the great mutations of the year, or the air, ſhe fell into moſt cruel fits of the *Dyſpnæa*, or difficult breathing: So that the Lungs being inflated, and carried upwards towards her Throat, and there held almoſt in a continual Diaſtole, ſhe could hardly, nay, not at all breathe: in the mean time, for that Reſpiration might be ſomehow made, the *Diaphragma*, and the muſcles of the breaſt were exerciſed with repeated endeavours of motions. This kind of fit by degrees remitting within Seven or Eight hours, at length gave over; but then after a week or two it was wont to come again, either of it ſelf, or from any the leaſt occaſion; after that the force of the Diſeaſe, its matter being beſtow'd on very many of theſe kind of fits, paſs'd away, this excellent Virgin was well enough for many weeks, yea, ſometimes months after, and breath'd freely, without any fault of the *Thorax*: For this perſon I inſtituted this following method, Spring and Fall, and now it is more than two years ſince ſhe has had any fit of this Diſtemper.

Take of our *Sulphur of Antimony*, gr. vi. of *Cream of Tartar*, vi grains, mix them: Let it be given in the pap of a roaſted Apple; with this medicine ſhe was wont to vomit Four or Five times: Four days after ſhe took this Cathartic, which was wont to be repeated

peated twice, after Six or Seven days between: Take *Calomelan* xii. grains, of the *Resin of Jolop* v. grains, of *Castor* gr. iiii. with what will suffice of *Ammoniac* dissolved, make iii. pills: Every day besides, she took morning and evening of the tincture of *Antimony*, grains xii. in a Spoonful of the following Julap, drinking after it Six or Seven Spoonfuls of the same. Take of the *water of Snails*, Ounces vi. of *Earth-worms*, Ounces iiii. of *water of Penny-royal* and *Rue*, each Ounces iii. of *hysterical water*, Ounces iii. of *Castor* tied in a knot, and hung in the glass, ʒ ß. of *white-sugar*, Ounce j. mix them in the glass, and make a Julap.

About the Autumn of the last year, another noble Virgin, being sick after the same manner, *viz.* with a Periodical *Asthma*, I was sent for to cure her, who received great help by the aforesaid Remedies, being used in a little lesser dose, and the same repeated at the first of the Spring. *4. Observation.*

In these Cases also nothing seems to appear more clearly, than that the cause of the Disease, without any phlegm or viscous humour, being impacted in the Lungs, as is commonly believed, doth subsist within the nervous stock; and that this kind of *Dyspnæa*, or difficult breathing, meerly convulsive, is excited, by reason of the pneumonic Nerves, being possessed by the Convulsive Distemper. The verity of this may be yet more clearly evinced by an anatomical Observation, lately communicated to me by the learned Physitian Doctor *Walter Needham*: That most famous man told me, That he knew a *Butcher* of *Walsullen*, in the County of *Stafford*, who when he had been long sick of a periodical *Asthma*, returning within 14, or 20. days at farthest, at length he died in a fit: The body being opened, all his *Viscera* appeared sound, chiefly his Lungs; neither were there to be seen any signs either of Excrement gathered together in the *Bronchia*, or of the blood restagnating in the Veins; this only hapned besides Nature, that the bladder of the gall contained in it many stones. But (added he) the causes unknown to us, certainly not conspicuous to our eyes, were to be attributed to the nervous stock, being affected. *An anatomical Observation.*

Sometime past I was consulted with about about a noble child, who being about 12. months old, was grievously afflicted with Convulsive fits, and as it were Epileptic, of which he quickly died. I often observed, that whilest the Convulsion of the outward parts intermitted, he was taken with a cruel sobbing, or hooping Cough; from whence I suspected, that the morbific matter was no less fixed in the breast than in the brain. But after its death, the Body being opened, the Lungs well furnished, appeared clear from any fault, that it clearly appeared, that this Cough meerly Convulsive, was excited by reason of the Distemper of the nervous stock. *Another Anatomical Observation.*

As to what respects the Remedies, and curatory means, which ought to be used in the aforesaid cases, when that convulsive Symptoms come upon the Cough, or difficulty of breathing, first excited from the default of the Lungs, and so by reason of the taint, communicated to the brain; it must be carefully heeded, that Convulsive Medicines be aptly compounded, with those respecting all the intentions of the *Thorax*. Yea, that sometimes these, sometimes those, being given by themselves, may between whiles fill up the times of curing; it will not be needful in this place to bring the bechic, or pneumonic medicines, and forms of them, since an immense company of them are extant every where among Physical Authors. It will be sufficient for our purpose, to add a method of Medicine, also some more select Remedies convenient for the Cough and *Asthma*, meerly Convulsive.

As to the former Distemper, which is most familiar to children, the cure is difficult, and for the most part not to be performed but of a long time. The chief Indications will be to purge forth both the serous and sharp humours from the Blood and *Viscera*, that their inclination and falling down in the brain, and perhaps also within the breast, may be sometimes prevented; then to corroborate those parts, that they may not easily admit the superfluities of the boyling Serum. For these ends, Vomits and more gentle Purges for the most part are useful, and in some measure ought to be repeated: Vesecatories are often profitable; yea, if the Disease be contumacious, Issues are to be made in the nape of the neck, or the arm, or about the armpits: Drink and liquid aliments are to be taken in a lesser quantity than usual, and instead of them a Bochet is to be used of *Sarsa*, *China*, *Sanders*, *Shavings of Ivory*, and *Harts-horn*, with diuretic and anticonvulsive Ingredients: In this case, some Remedies, as it were special, are greatly commended, of which sort are pixed musk given in powder, or boyled in milk, and so given daily in a frequent dose: a decoction or *Syrrop of Castor* and *Saffron*; decoctions of the *Root of Pæony*, *Misletow* of the *Oak*, also of *Hyssop*, help many; the waters of *Black-cherries*, of *Saxifrage*, and of *Snails*, distilled with *Whey*, and appropriate Ingredients, are often taken with success. *The cure of the Convulsive Cough.*

2. By

The cure of the Convulsive Asthma.

2. By what method, and with what Remedies I have cured the periodical *Asthma* in some young ones, hath been already shown; but in most distempered with this Disease, the most famous *Riverius* hath observed, a Vomit is chiefly helpful, also he hath not rightly shown the Reason: which indeed seems to consist in this, to wit, That this medicine greatly shaking and irritating the Emunctories planted about the first Passages, strongly presses out from them, and carries forth of doors the recrements of the blood and nervous juice, apt to be troublesome, and to restagnate on the brain and nervous stock. *Zacutus*, the *Lusitanian*, highly extols, and not without Reason, a cautery to be made, sometimes in the hinder part of the head, sometimes in the nape of the neck, or about the Armpits: A preparation of *milipedes*, *viz.* in form of a dry powder, or a distilled liquor, seldom wants success. For by such like Remedies the superfluities of the *Serum* are deduced from the head and nervous stock, and carried away thorow the urinary passages: For the same Reason a gentle purge, evacuating the ill juice, is often us'd: for this end the decoction of an old Cock, with altering medicines, and gently purging, being stowed in its belly, is praised by many: Besides the Remedies hitherto cited, some others are said to be appropriate, and as it were specifical to the *Asthma*, of which sort are, the *bassom of Sulphur*, *Turpentine*, also *Spirits of Harrts-horn*, or of *Sut*, impregnated with the same, *Syrrop of Tobacco*, of *Ammoniack*, our *diasulphur Lohoch* of *Garlick*, pills of the *Roots of Eluna Campane*, made up with the *milk of Sulphur*, with the *flowers of Benzoin*, with liquid pitch, or liquid amber, with many others, which would be too tedious here to enumerate.

And now the chief *Species*, and manner of Convulsions, together with the Causes of the Symptoms, and the means of curing, being sufficiently explicated, it is time to put an end to this our Pathology of the Brain and Nervous stock, and to our Discourse of *Convulsive Diseases*.

FINIS.

Pharmaceutice Rationalis:

OR, AN

EXERCITATION

OF THE

OPERATIONS

OF

MEDICINES

IN

Humane Bodies:

SHEWING

The Signs, Cauſes, and Cures of moſt Diſtempers incident thereunto.

In Two PARTS.

AS ALSO

A Treatiſe of the SCURVY, and the ſeveral ſorts thereof, with their Symptoms, Cauſes, and Cure.

By *Tho. Willis*, M. D. and *Sidley* Profeſſor in the Univerſity of *Oxford*; Alſo one of the College of Phyſicians in *London*, and Fellow of the *Royal Society*.

LONDON:

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HOUSEHOLD MEDICINES

OR

SUGGESTIONS

AS TO

SIMPLE REMEDIES

FOR

COMMON AILMENTS

THE PREFACE TO THE READER.

WE have obſerved, that it hath been of exceeding great Benefit to many other Arts and Sciences, that Experiments and Obſervations either by chance or on ſet purpoſe being found out, that preſently the Ætiology or the Reaſons thereof, as much as may be, ſhould be ſet down, which thing we have much deſired in Phyſick, which may be juſtly placed amongſt the nobleſt of the Sciences. In Mathematicks and Mechanicks, Experience and Practice did firſt aſſiſt the Theory, then this ſhewing the cauſes of things and the means of their effecting, hath not only adorned, but very much increaſed and illuſtrated the Practice. But the Mechanical Art, although at firſt known to *Empericks*, and taken up by quacking Juglers and old Women, as if it were a Myſtery into whoſe Reaſons it were not lawful to ſearch, has remained hitherto unexplicated: Wherefore the unlearned, and indeed ſometimes the learned at this time give Medicines (like People ſhooting at random) raſhly and

almoſt fortuitouſly; being uncertain whither they will tend, or what end or effects they ſhall have. From hence it is, that not only ſome learned *Cynicks*, but the vileſt of the ſcum of the people bark againſt and fling dirt upon *Phyſick*. And truly I know not how ſhe will be wholly excuſed from being called a Lyar, Vain, and Jugler, ſo long as yet the reaſons of curing by Medicine, on which the life and health of Man much depends, and oftentimes by which 'tis no leſs indangered, lye hid. But this Doctrine of *Medicinal Operations* either neglected or ignored, ſhewing like a great *Chaſm*, hath been the only, or at leaſt the greateſt Impediment that *Phyſick* is not come to its perfection, and its whole *Syſtem* rightly framed: For though the matter of *Medicine* gotten from each *family* of the *Vegetables*, *Minerals*, and *Animals*, ſeems ſufficiently digeſted and compleated, and that the Types and Natures of all Diſeaſes being collected by moſt accurate Obſervations are explicated by innumerable Authors, and beſides that the *humane Body* as it were a *martial Field*, where thoſe *Champions* try their Skill, be exactly deſcribed as to all its parts by *Anatomiſts*, yet what is of *greateſt moment*, and without which the aforeſaid things ſignifie little, is not yet ſufficiently and clearly detected; to wit, what the *Weapons* of thoſe *Champions* are, what Furniture, what force and Reſiſtance they have, alſo what Action, Paſſion, and Reaction may be between the Particles of the Medicine and the Spirits, Humors, and Solid Parts. But ſince almoſt the whole buſineſs of this *Pharmaceutick Drame* is acted behind the Curtain, therefore the various congreſſions of *Particles*, *Fermentations*, *Impulſes*, and other diverſities of Motions, which performed within, lye hid from the Senſes, are to be ſearched out

by

by a more deep Scrutiny of the Intellect, which if it may be at laſt performed, there is nothing more will be deſired, whereby *Phyſick* being performed in all its parts, may grow to a true Science and be practiſed with greater certainty, not inferiour to the *Mathematicks*. For ſo the *Empirical Remedies* left us by the Antients would not be adminiſtred promiſcuouſly and amiſs (as is wont now by *Medicaſters*) in every ſtate of the Diſeaſe or caſe of the Sick, but opportunely and always according to the moſt apt intentions of healing. Beſides, new and more efficacious *Medicines* (as often as ſome great and unuſual Diſeaſes require them) may be eaſily and ſafely found out, without any error of the *Phyſician* or danger of the *Patient*. For whilſt it clearly appears what kind of Particles in the *Patient* are either to be altered or ſtirred up into Motion, and what are required in the *Agent* for that work, it will be no difficult thing aptly to deſign this, and rightly to accommodate one to the other. But the buſineſs is far otherwiſe performed by thoſe *Pſeudochymiſts* with notable danger and abuſe of the *humane Body*, who not contented with the uſe of received and approved *Remedies*, bragg that they have framed in their Furnaces no leſs than a *great Elixir*, a *certain Panacea*, or an *univerſal Medicine*, whilſt in the mean time they unskilfully meddle with *Minerals*, expecting a certain uncertain event rather than deſigning any thing ſeriouſly; If perchance there ſhould appear an unuſual product with this *new Medicine* (the Virtues of which are altogether unknown, or are none, or poyſonous) they promiſe themſelves preſently to Cure all Diſeaſes, and give it boldly in every caſe, to the great hurt, and not ſeldom to the Diſtruction of the Sick;

ſo

ſo ſecurely and raſhly are theſe *Executioners* wont to ſport with Man's Life, whilſt they are led to the preparing or adminiſtring theſe Medicines (in which always lurks ſome *venomous Sting*) without any counſel or direction of Method, but by meer chance and with a certain blind undertaking.

Therefore it is highly to be wiſhed, both for the Dignity and Augmentation of *Medicine*, and for the Cure and Safety of Man's Health, that the Energies and Manner, as to the Nature of each, and as it were the Mechanical Means of the working of Medicines in our Bodies might be laid open. For if it ſhall be plainly known by what means *Medicines* being taken do preſently exerciſe their powers in the firſt Paſſages, and from thence by and by diffuſe them through the whole Body, and by what alteration they receive in each Region, and what they do or perform upon the Spirits or Blood, and Humors or Solid Parts, then indeed Evacuation may be much more ſafely and certainly uſed, and with greater Benefit to the Sick.

But if having boldly aſſaulted this Province, to wit, the ſhewing a reaſon of the *Pharmaceutical Operation*, before untouched, I ſhall not ſufficiently perform my Work, I do however deſerve Pardon, becauſe I am forced to travel through not only an *unknown Country*, but alſo one that is *uneven* and as it were a *Labyrinth*; and if perhaps going through this Tract I have not yet ſufficiently found out all the more ſecret Receſſes, and every more intimate Corner, and what is acted in them; yet I ſuppoſe that I have made way for others, who may have a mind more accuratly to find them out.

For

For truly if these two things which I have followed in the whole Disquisition should be exactly known, *viz.* By what means *Medicines* or their *Particles* affect the *Animal Spirits* in every place, also by what and how many ways they Ferment the *Blood* and *Humours*, from thence a Path would lead to the unfolding the *Reasons* of every *Evacuation.* For the better laying open of the ways of the whole curing by *Medicines*, we have taken care to have accurately discribed the *Ventricle* and *Intestines*, even to all the *Membranes* and *Fibres* of them, in which the *Animal Spirits* dwell, and where they are first of all affected by the *Particles* of the *Medicine.* For although the *Substances*, *Figures*, *Cavities*, *Sites* and *Connexions* of these are long since sufficiently enough delineated, yet we have manifested most clearly without any Example or following of any other Authors, the *Nervous* and *Musculary* and *Glandulous Membranes* of each of them, and some *Fibres* meerly sensible, and others motional, as also the thick set enfoldings of the sanguiferous Vessels, and innumerable *Glandula's* incrusting the Back of the interior Coat from the Mouth even to the *Anum*, this making very much for the illustrating the *Pharmaceutical Doctrin:* concerning which *Anatomical Inventions* I must acknowledg my self to be beholden (as formerly to some others, so now again) to the Industry and sedulous Pains of the Learned Doctor *King*, and also my Friend Doctor *Masters* hath set to his helping Hand, in the finishing of this Task.

At the beginning of this Work I did design to handle the whole *Pharmacie* and to weigh the Reasons of all or at least its chief Operations: But whilst this work

work was under my Hands it grew into ſo great a Bulk, through the Fertility of the Subject, that I was forc'd to break off long before the end, and to finiſh it before I had half done. For beſides the *univerſal Medicines*, whoſe Energies and manner of working we have already deſcribed, there are other *Remedies* (commonly called *Specifick* and *Appropiate*) which belong to this Speculation; to wit, which are given to cure either ſome peculiar Diſeaſes, or which are ſaid to reſpect ſome Region or part of the Body. Of ſome of theſe, and eſpecially of Medicines proper for the Breaſt, I had begun ſome Meditations. But when I conſider that I muſt Sail in a dangerous Sea, every where full of Rocks of Cenſures and Contumelies, I think it no Wiſdom to venture my whole Cargo at once in this weak Bottom, but firſt of all with theſe few to try my Fortune, which if it be proſperous, I may perhaps be leſs affraid to expoſe the reſt of this Nature hereafter.

The

SECT. I.

Of the Operations of Medicins in Mans Body.

CHAP. I.

The Design of the Whole Work.

The Original of Physick.

THat Physick, from its Original down to the time wherein *Hippocrates* lived, was meerly Experimental, is well known to all who have read the History of it. For several Men having tried several Remedies, if they found any thing that was helpful in such a particular case, they afterward applied the same upon the like occasion. Wherefore, as *Herodotus* tells us, the ancient Egyptians brought their Sick, not to Physicians, but into the Street, and publick High-ways, to desire the advice of all Passengers, in order to the Cure of such or such a Disease. Nay not onely in *Egypt*, but in *Greece* too, the Priests took in writing the Receipts for each Cure, and laid up their Observations in their Temples, that they might be in readiness as oft as any other distempered persons should have need of them. But when through the daily and vast increase of Observations, Physick began to be reduced into Rules and Method, their whole business was, first, to take care that their Medicins were well prepared, according to the best Prescriptions; and Secondly, that the Reasons or Circumstances, why and when they were to be used, might be as plainly known. Now therefore if any one understood both these Parts of Physick, he was esteemed as an absolute Doctor. But indeed, in this affair, as well as in the whole Practice of Physick, we may truly say, we want some body or other to tell us, how and by what means all Medicins, inwardly taken, or outwardly applied, perform their operations; *to wit*, First, How, and why one gives you a Vomit, another a Purge, a third causes Sweat, Alteration, or some other Operation: Secondly, What agreement or disagreement there is between the bigger, and the smaller parts both in the Agent and the Patient, as likewise what Motion backward or forward. And Thirdly, What a struggling (as it were) and Fermentation there happens, when such parts mix with one another, and after what manner they produce their effects. To all which the vulgar answer is, that Medicins work by certain specifick Virtues, whereby they exert their peculiar strength and power: which is indeed no more than if a man should say, such a thing is so, because it is so. As when it is said, some things are apt to make People vomit, because they have a faculty of moving us to vomit. Since therefore the knowledge of Medicinal operations hath been hitherto left almost untouched by all Physicians, it seems worth while to inquire concerning that mechanical way (as it were) whereby all sorts of Medicins work upon our Bodies, so that, as we please, they either purge or bind, raise or allay heats in the Bloud and Humours, or relieve the necessities, and make amends for the irregularities of every particular part or member in some peculiar manner. For the performing whereof, although it be not of any great moment in what order the several sorts of Medicins are set down, yet, for Methods sake, I thought fit first to give some general account of them, and then accordingly to reduce them into their proper order. We therefore ought first of all to distinguish the several places, in which Medicins begin to operate, and are commonly divided into three regions, that is to say, First, The first Passages, in which are chiefly comprized the Stomach, Guts, Passage of the Gall and Sweet-bread, together with the Mouths of the Mesaraick Vessels. Secondly, The Mass of Bloud, with all its bloudy appendages, as the *Præcordia*, the Liver, Spleen, *&c.* And Thirdly, The Braine, and Nerves, with all the Members and the Habit of the Body. But besides these several Spheres of Activity, of which sometimes this or that apart, and sometimes more of them, or all together are affected by a Medicin. We must moreover in the second place consider those immediate Subjects upon which Medicins work, which indeed are not solid parts, but either the Animal Spirits or the Humours: though the former are sometimes moved by mediation of the latter. Medicins

The Progress and increase of it.

We want an account of the Operation of Medicins.

The Mechanical reason of them is inquired into.

The places where Medicins begin to operate.

The Subjects on which they operate.

Phar. Rat. Part. I.

inwardly taken work either immediately upon the Animal Spirits that are in the fibres of the Weazon, Stomach, Guts, and other paſſages among thoſe we call the firſt; or, by mediation of the Bloud, upon them that reſide in the Brain, and in the nervous or membranous fibres of the remoter parts. When therefore the virtue of ſuch Medicins makes any impreſſion upon thoſe Spirits, it either provokes and moves them toward purgation, or cheriſhing and recruiting, makes them expand themſelves with a kind of delight, or by aſſwaging of them appeaſes and removes all things that diſcompoſe or moleſt them; or laſtly by over-powering of them lays their fury aſleep. The Humours upon which Medicins inwardly taken work, are both the Ferments, and ſlimy coverings of the Stomach and Guts, the Bloud, with the nutritive Juice and other leſs noble Humours, as the *Serum* or Whey of the Bloud, both kinds of Choler, the Prancreatick or Sweetbread juice, the Watery Humour, and the Nervous Liquor: upon which ſometimes ſeverally, and ſometimes jointly Medicins uſe differently to operate, in as much as that they either ſcatter and make them ſink, or alter their preſent temperament, by ſometimes ſtirring them up when they are dull and heavy, or cooling and aſſwaging of them when too hot; or laſtly by changing and reſtoring them gradually to their natural conſtitution when they are irregular in quality, conſiſtence, mixture, and other accidents. Seeing therefore that the conſiderations touching the operations of Medicins are ſo many and various, I will treat of them in order according to the places where they firſt and chiefly begin to work; and firſt of Cathartick, or cleanſing Medicins, both Vomits and Purges: Next of Diuretick, or Medicins that provoke Urine; Diaphoretick, or ſuch as cauſe Sweating, and Cordials; and laſtly of Opiates, or ſuch as cauſe Sleep, &c. and thoſe that are commonly called Specificks, that is, ſuch as are applied to the irregularities or defects of each particular Member or Entrail. In the handling of which I will obſerve theſe three things:

How they operate upon the Spirits.

The ſeveral ſorts of Humours.

How Medicins operate upon them.

The Method of this Treatiſe.

Three things to be obſerved in every kind of Medicin.

1. To ſhew the manner how each kind of Medicins operate upon the Humours or Spirits of a Mans Body, or upon both together, and likewiſe how they affect the ſolid parts.

2. To ſet down the ſeveral ſorts of Medicins in each kind, or at leaſt the chief of them, with the moſt choice Receipts: And

3. To tell you the beſt Chymical Remedies, relating to each of thoſe ſorts, together with their Cauſes, that is to ſay, the variety of changes and accidents that happen in the preparations of them, and the reaſons of thoſe virtues and effects which are ſo manifeſt in them when prepared.

But in the fourth place, there might be added to all this another Tract alſo concerning the Nature of Medicin, to ſhew how, when the cauſes of Chymical Preparations are rightly conſidered, there may be neater and more uſeful proviſions made of ſuch kind of Remedies. But I ſhall reſerve that Deſign till another time, becauſe it comprehends many Secrets which may be eaſily tranſgreſſed by raſh Quacks, who, to the great hazard of the Sick, (but unpuniſhed) do at this day often make up Medicins which they can onely read. The next thing therefore that I have to do, is briefly and accurately to deſcribe the firſt Paſſages, as they are commonly called, in which Phyſick begins to work, being as it were the firſt Scene of each medicinal action.

CHAP.

Phar. Rat. Part. I.

CHAP. II.

The Description, Uses, and Affections of the Parts in which Medicins begin first to operate.

SInce Medicins and Food go into the Body of Man the same way, and are conveyed through the very same passages in all respects, it is therefore necessary for the understanding how Medicins work, as well as how Chyle is made and distributed, to give you a kind of Landschape of those Parts and Entrails, in which the actions of both are performed. But to make this a full and perfect Work, would be to write the whole Anatomy of Mans Body. Wherefore I shall briefly describe onely those parts, into which Medicins are first received, and where they begin to work. Now these are the Weazon, Stomach, and Guts, with their appurtenances, in which not onely Vomits and Purges, but also Cordials, Opiates, and Diaphoreticks, with other Medicins of all sorts do first exert their Virtues, and are determined to every operation. I therefore will not trouble you with a perfect description of them (because that hath been done very accurately already by other Anatomists) but will give you onely some short account, enough to illustrate this practical part of Physick. And again, since all Medicins work more immediately upon the Spirits, or Humours, or both together, and that the Subjects in which they reside, are the Fibres, Membranes, Vessels, and Passages, I will particularly shew you how these stand, and use to be affected in the aforesaid Entrails.

The first Passages.

Spirits and Humours are the first Subjects upon which Medicins work; and fibres, &c. the next.

1. The Weazon, according to the common opinion and observation, hath three coats, whereof the inner hath a kind of vail on its inside, consisting of fibres, like unto small hairs, which covers all its cavity as it were with Down; but the other part of this same coat is altogether nervous, and full of fibres, not onely of various sorts but also variously interwoven, just as the inner coat of the Stomach and Guts. Moreover this membrane is continued to that which covers the Palate, Mouth, Jaws, and Lips; nor onely so, but it also descends as low as the Stomach, and covering the mouth thereof, goes down into it three inches all over the sides. Now this lower part of this same nervous coat, within the orifice of the Stomach is very thick and hairy, and appears much different from the inner coat of the Stomach which it covers; as you may more fully discern when it is parboiled: for then that coat which comes down from the Weazon, is much whiter than the inner one, which belongs to the Stomach. That part, no question, contributes very much to exquisite, nice Sensation. For hence it proceeds, that when we take in and swallow down grateful food, we feel a sort of pleasure even till it enters the Stomach: and so on the contrary, if we eat, or but remember any ungrateful thing, there is such a disturbance in this part, as that we presently keck or vomit. And the deep insertion of this coat into the Stomach, causes that near and speedy commerce between the Stomach and the Weazon, in so much that if either of them be moved to Vomiting, the other presently sympathizes; and being that the same coat covers the Palat and other parts of the mouth, they all agree in a mutual consent to vomit.

The Weazon hath 3 Coats.

The inner Coat is nervous, but covered with a kind of Down.

It goes into the mouth of the Stomach, and covers it for some space.

It creates a sense of Tasting in the Weazon and in the mouth of the Stomach.

2. The next Coat belonging to the Weazon is very fleshy and thick, as if it were a Muscle with a hole bored through it: and *Hofman* says it is really a Muscle, obnoxious both to the Palsie and Convulsions. Now the fleshy fibres of this coat are commonly thought to be round and transverse, but the famous *Steno* hath observed them to be spiral, and in a double order or rank; that is to say, going cross each other, and resembling, as it were, two Cockles or Snails set opposite one to another. Of which, that I may tell you what I find by mine own observation; the whole Weazon seems to consist of two Muscles put together, which makes four parallel lines with the fibres that are opposite and cross each other. And this will plainly appear, if this middlemost coat of the Weazon, being stript of the rest, and bound at both ends, be blown full of wind, and dipt into boiling Water till its fibres be contracted and swell; for by that means there will two rows of descending fibres discover themselves and their tendons. But then again, if you turn this same coat upside down, and blow into it the other way, the opposite ranks of ascending fibres will likewise appear. Lastly, if it be cut lengthwise between the tendons, and laid fairly open, you shall see two parallel lines on one side and as many opposite on the other.

The second Coat of the Weazon.

Two opposite ranks of fibres that cause motion.

3. The third and outmost coat of the Weazon, which is common to that and the Stomach, and hath its rise from the Midriff (to which it is united whilst it passes through

The outmost Coat of the Weazon.

Phar. Rat. Part I.

the hole thereof) is very thin, consisting onely of membranous fibres, and those mighty slender too.

An inquiry into the use of these Coats.

As to the use and duty of these Parts, I say in general that the Inner coat is made chiefly for Sensation [by the Taste], the middlemost for Motion, and the third for a covering to them both. But it seems worth our while, since these are the first avenues or gates through which all Medicins pass, to enquire a little more largely and particularly into them.

What the hairy Covering serves for.

First therefore, Whereas the Inner coat of the Weazon is covered all over with an hairy vail like Down (which is also common to the Palat and the Tongue) the reason seems to be, because it may the more invite us to eat, which is an action so necessary to the preserving of life; I mean, that whilest we swallow grateful food, it may be caught hold on all along as it goes down the Weason, by those small hairs, and sticking sometimes in them, imprint a sense of pleasure upon the part. But the coat it self being made of nervous fibres onely, which are variously interwoven, contributes very much first to Sensation; next is thereby the stronger, like a Basket made of Twigs; and Thirdly may be the more easily stretched out. But their chief use is to receive all sensible [or tasteful] things, and presently to deliver them over to the common Sense, to the end that as they are there judged pleasant or unpleasant, the motions of swallowing or vomiting, may be either continued or renewed.

The nervous Coat is made for Sensation.

whether it serves for Motion too?

But in this place it may deserve our inquiry, Whether this coat which is altogether nervous, being interwoven with so many and various fibres, serves also for any motion? For since we know that the Weazon, and all the parts of it are moved several ways in Swallowing, Spitting, Vomiting, Yawning, and the like; and likewise that other membranous Entrails (as the Stomach especially, and the Guts) are drawn, blown up, and distended into various figures, we ought to explain by what Fibres, and how it comes to pass, that such various actions and passions happen.

Fallopius *his Opinion of the motion of Membranes?*

Fallopius, the best Anatomist of his time, having observed in that Muscle (which is the chief or onely instrument of local motion) *two parts; the one containing the fleshly body of that Muscle, and consisting of fleshy Fibres, as the other, which contains the chord or string, does of nervous ones; and that by these two, the body onely of the Muscle moves and contracts it self, whilest the chord is onely passive and doth not move it self:* at last concludes, *That no part in any Animal moves it self, unless it be fibrous, and made of true Flesh.* Observ. Anatom. p. 412.

That Contractions are performed by Fibres onely.

According to his opinion, I have lately shewn in a peculiar Tract, *not onely that it is so, but also how all Contractions are performed by fleshy Fibres onely*; to wit, *That these Fibres being suddenly blown up and swollen through the hasty infusion of the Spirits (which gush out of the tendinous Fibres) are presently shortned, and consequently draw the connected parts toward them.* But since it also very plainly appears that some nervous parts, and especially the hollow Entrails, are not onely contracted, but also expanded, much bloated, and enlarged into a greater width (which cannot be by contraction,) and since it likewise is very manifest, that the Animal Spirits within the nervous fibres, are moved no less than in the fleshy ones; as also that in them they flow not onely very gently, but sometimes are disturbed, and discharged with great violence. These things, I say, being presupposed, I affirm, That the Animal Spirits which are in the nervous or membranous Fibres, cause not onely perception, or sense, (which is their proper office) but also some kinds of local motion, as Expansions, or Inflations [or Widenings and Bloatings.] For when the Animal Spirits upon their discharge are mightily rarefied, and thereupon violently enter these Fibres (which contrary to the fleshy ones, are not ranged in certain rowes, but scattered every way, and may be attenuated, distended or dilated into a greater compass) it necessarily follows, that any Entrail consisting of such fibres, must be totally blown up, and that every side of it being unfolded, and laid smooth, must be attenuated and enlarged into a greater capacity or extent. And indeed if we consider the design of Nature, it is convenient that sometimes it should be so, to the end that whilest the parts which are either composed of Membranes, or otherwise supported or covered by them, are thus expanded [or widened] the superfluous or vicious Humours, which are setled in them, or stick to them, may be cleared and carried off. To this end, and by this means I suppose stretching, yawning, and some other motions of Inflation and Distention are set on foot. Upon which account, since we see that in yawning the passage of the Weazon is widened even whether we will or no, and as it were filled with wind, or expanded, we may conclude the reason of it to proceed from the inner coat of the Weazon, which, to relieve it self from that immoderate moisture (with which it is oppressed) is widened and enlarged by a kind of explosion, or discharge of the Spirits. Moreover, when we endeavour to hinder our motion to yawn (because it seems always troublesom and indecent)

That Expansions are caused by the nervous Fibres.

As in Stretching, Yawning, &c.

The reason of Yawning.

cent) immediately the fleshy fibres of the outward coat are contracted: from whence there ariſes in the coats of the Weazon a kind of ſtruggling as it were, between theſe oppoſite endeavours to ſtretch and contract them. How the Animal Spirits in Convulſions do ſo much inflate, or blow up, and raiſe the membranous Entrals, and ſwell them with a motion like the skipping of a living Animal, I have ſhewn in another place. But to proceed; The reaſon why an ill Medicin, or Poiſon cauſes ſuch horrid diſtentions and inflations of the Stomach and Guts, and alſo oftentimes ſuch ſudden and extraordinary ſwellings in the whole lower Belly, is, becauſe the Animal Spirits being extremely diſturbed, and forced to a violent exploſion or diſcharge, run all together into the membranous fibres, and extend or ſtretch them out to the utmoſt; that the Entral which is made up of them, may be immediately filled with wind, and enlarged as much as poſſible. But now, having digreſſed in this Diſcourſe concerning the motion of Membranes, let us conſider the uſe of the other coat of the Weazon.

The reaſon why the Membranes are diſtended.

2. The middlemoſt coat of the Weazon being very fleſhy and thick, as conſiſting of two ranks of fleſhy fibres, which aſcend and deſcend obliquely acroſs one the other, ought to be reckoned, as it were, a double Muſcle; and ſince the one row of fibres ſo deſcending ſerves for ſwallowing, the other queſtionleſs, aſcending, performs the offices of Spitting and Vomiting. I have known ſome, who having a Palſie in this fleſhy coat of the Weazon, have been hardly able to ſwallow; and others, who through the relaxation or total looſening of thoſe fibres, have died for hunger. Beſides which, we may gueſs, that the ſenſe of being choaked as it were, and the aſcent of ſomewhat like a round Ball in thoſe that are troubled with Fits of the Mother are occaſioned by the nervous fibres of the inner coat being too much ſwelled and diſtended, when the Spirits that are in them are exploded or diſcharged.

The middlemoſt Coat of the Weazon is fleſhy and conſiſts of two ranks of motive fibres.

But 3. Of the outmoſt coat of the Weazon I need not ſay much; for that, as it conſiſts of very ſmall and membranous fibres, ſo it ſeems to be deſigned onely for a covering to this ſame Entral.

Secondly, The Stomach (in which the Weazon ends, and inſerts its nervous coat into the left orifice thereof) is long like a Snapſack, with a large round bottom, and a plain ſhort top, wherein there are two orifices [or mouths] placed oppoſite to each other at ſome diſtance: through the left of which the meat deſcends in a ſtreight perpendicular paſſage down into the Stomach, and being there diſſolved and changed into Chyle, aſcends again through the right orifice, whoſe paſſage is oblique, and goes into the Guts; ſo that whatever paſſes out of the Stomach at either door, goes upward; and therefore, that the Stomach may diſcharge what is in it, either the left way by Vomit, or the right way by Stool, it is neceſſary that the bottom and ſides of it being at the ſame time contracted and raiſed up, ſhould lean altogether to this or that orifice.

A deſcription of the Stomach.

So much for the outſide of the Stomach: Now we ought further to conſider in this Entrail (as it relates to practical Phyſick) the coats of it, together with the texture [or interweaving] of the Fibres; as likewiſe its orifices, veſſels, and paſſages, with all their actions and uſes. Now the Stomach, juſt as the Weazon, conſiſts of three coats; the one common, which riſes from the Midriff; and two proper, to wit, an outward, and an inward.

It hath three coats.

Of which the innermoſt is altogether nervous, and (as I ſaid of the Weazon) covered on the inſide all over with an hairy ſubſtance, like ſmall ſtrait threds, faſtned perpendicularly into the coat it ſelf, as you ſee in Velvet. This Vail or Covering, being ſpread all over the inſide of the Stomach, appears very plainly after it is a little boiled, though different from that which lines the Weazon (as being thin and not ſo white) but is like to that which covers the Tongue. For the ſurface both of the Tongue and Stomach too, ought to be rough, as it is, that the ſmall parts of Food which we taſte, or ſwallow, may be detained in it for ſome time, and then by degrees delivered over to the nervous coat, which might otherwiſe be in danger of being too much affected by their naked and immediate touching of it, and thereby grow harder and leſs ſenſible. But this hairy Vail of the Stomach ſerves likewiſe for other uſes; for in that the reliques of the Chyle being gathered together, and kept till they become acid, or ſharp, turn into a kind of Ferment, which is requiſite both for the appetite and digeſtion. So alſo this ſame Down, not onely covers but guards the mouths of the Veſſels, which are very numerouſly inſerted into the nervous coat, and receives the Humours which iſſue out of the Arteries and Nerves, whileſt at the ſame time the Veins ſuck out the Chyle or other Juices which abound in this part. But this hairy Vail or Covering, on its back-part or convex ſurface, by which it joins to the nervous coat, is all over ſet with annular or round glandules [or kernels] to a vaſt number, which, no doubt, cover the mouths of thoſe Veſſels which lie open in the nervous coat,

The inward one is nervous and covered with a kind of Down.

The uſes of the hairy Vail.

Phar. Rat. Part. I.

coat, and probably do more immediately receive and ſtrain the moiſture deſigned for them, or diſcharged by them.

This hairy Veil is a Coat by it ſelf.

This hairy Veil or Covering is eaſily ſeparated by dipping the Stomach into boiling Water, and then it appears to be a coat, firm enough of it ſelf, and diſtinct from all others; and may (for the reaſon juſt now given) not improperly be called *the glandulous coat.* When this therefore is taken off, the nervous coat it ſelf appears, conſiſting of fibres of divers kinds, and variouſly interwoven; through the thin web whereof (deſcribed in the Figure *A.A.*) an innumerable company of Bloud-Veſſels ſpread themſelves into a thouſand little branches, and terminate in the inner ſurface of it, where they join to the glandulous coat. Parts of both theſe Membranes, to wit, the nervous and the glandulous too, are repreſented by Figures in the Fourth Table.

The nervous Coat is full of little Bloud-Veſſels.

This nervous coat makes the inner cavity or hollow of the Stomack, like a Chymical Veſſel, called a Matrace, in which the Food is diſſolved and digeſted into Chyle: and the Fibres of it contribute chiefly to Senſation, but it may be, in ſome meaſure, to motion too. As to the former, theſe Fibres being emptied create hunger, and being wrinkled through drouth or ſaltneſs, or heated with Aromatick or Winy Drinks, make us thirſty; but if at any time ſharp or acid humours either prick or gnaw them, we have the Heart-burn. In fine, all Medicins work chiefly upon theſe Fibres, and according to the ſenſible impreſſion made upon them, ſuch or ſuch an operation (as I ſhall hereafter ſhew) ſucceeds. As ſoon as theſe fibres are filled with convenient food, which is conveyed into the Stomach, immediately the Spirits that are in them receive a kind of pleaſure and ſatisfaction, and then, by an univerſal conſent of them all, the ſenſitive ſoul in general is refreſhed, and does as it were rejoice, whileſt at the ſame time the Veins ſtrait ſuck up the thinneſt part of the Chyle, and ſupply the flame of Life with new combuſtible matter.

The uſe of this Coat in point of Senſation.

The motions of it.

As to the motion of this coat, though we utterly deny it to make any ſpontaneous contractions, yet it is plain enough that it is frequently diſtended, blown up, ſwollen and enlarged into a greater compaſs: and that proceeds not onely from wind that is bred within the hollow of the Stomach, but much oftner from the Spirits that reſide in the fibres themſelves; which Spirits if they are very much diſturbed and forced upon an exploſion or violent diſcharge, and run all together tumultuouſly into the fibres, they blow them up, and ſtretch them extremely, ſo as to make the whole membrane ſwell like a Bladder full of wind. For if thoſe nervous fibres were all hollow like ſo many ſmall tubes, or pipes, and ſuddenly filled with wind, it would neceſſarily follow that the Veſſel, which is made of them, muſt be as ſoon diſtended and dilated or widened. So it is, when the Spirits, being ſtung as it were, with ſome great diſturbance, ruſh violently into them. And upon this account it is, that the Stomach in Fits of the Mother, and of the Cholick, as alſo often in [the Spleen or] Hypochondriack Diſtemper, the Stomach uſes to ſwell. Hence alſo comes the Hickock with its reciprocations or returns, for that the Stomach is one while blown up and filled with wind as it were by theſe fibres, and another while emptied again by the Syſtole or contraction of the Midriff. In fine, all venoms and poiſons in reſpect of their extraordinary ſtimulating and diſturbing of the Spirits, and forcing them to run furiouſly into the fibres, do often cauſe horrid diſtenſions and ſwellings of the Stomach and other Entrals; and from ſome ſuch cauſe I affirm alſo the Tympany to proceed.

The cauſe of the Tympany is hinted at.

This inner Coat in ſound Bodies hath many wrinkles or folds in it, which appear in the concave ſurface of the Stomach, and look like ſo many little ditches or furrows, in which the ſeveral portions of Chyle, being diſperſed in very ſmall quantities to divers apartments, might be the better detained from each other in order to concoction, and not ſuffered to run together into one thick maſs. The reaſon of theſe folds is, becauſe this coat is much larger than the fleſhy one which is more outward; wherefore that the former might be contained by the latter, it was neceſſary for it to be contracted or gathered into wrinkles or folds. But in Drunkards and Gluttons, whoſe fleſhy coat is very much ſtretched through their frequent and immoderate gormandizing, the inner coat alſo is of the ſame extent with that, and looſening all its folds, becomes plain and thin like a Bladder blown full of wind. The aforeſaid wrinkles and folds are expreſſed in *Tab.4.Fig.*1.

The reaſon of the wrinkles in the inner coat of the Stomach.

The fleſhy Coat of the Stomach.

2. The next coat of the Stomach which is both proper to it, and altogether fleſhy, conſiſts of none but fleſhy fibres, and ſeems to ſerve onely for ſeveral motions, and thoſe onely contractive. Indeed the whole Body of the Stomach is covered with this membrane or fleſhy cloak, which contracts and compoſes it very differently according to the various uſes and offices that occur. For ſince the Stomach, in the work of chylification [or making of Chyle] and the operations of Medicins ought to be altered

and

and modified into ſeveral poſtures, for that reaſon this coat contains many ranks of moving fibres, which are mighty admirable. Now though it be difficult to deſcribe them, as being very intricate, yet becauſe it very much concerns the Nature and operation of Medicins, I therefore ſhall endeavour according to my beſt ability to give you the particular Anatomy of it, which has been hitherto ſcarce touched upon by any other hand.

The Anatomy of the Stomach.

In order thereunto, let the Stomach of a Man or a Sheep, being emptied, and blown full of wind, and then tied at both ends, be dipped ſeveral times into boiling Water till the fibres are by degrees contracted and ſwell, and the whole ſeems parboiled; and then take notice of the outmoſt coat, or membrane, which covers the whole Stomach.

Of the outmoſt Coat thereof.

The fibres of this coat running out from one orifice to the other, encompaſs the bottom and ſides of the Stomach all the length of them, and according to the different uſe of them, are either longer or ſhorter, more ſtrait or crooked. Beſides which, in ſome places, that is, near the orifices and about the bottom and ends of the Stomach they are much thicker than in the middle, in ſo much that they there ſeem fleſhy, and in ſome meaſure ſubſervient to motion. The nervous fibres of this membrane (as you may obſerve in many Muſcles) cut fleſhy fibres that are immediately under them at right angles; it being their office not onely to cover, but to bind and keep each one of them within their ranks, ſo as not to let them ſtart out: The Figure of which is well repreſented in *Tab.*2.

Of the middlemoſt.

When therefore the outmoſt coat is ſeparated and removed, a row of fleſhy fibres lies juſt under at right angles; which encompaſſing the bottom and ſides of the Stomach by way of depth, are terminated in the plain upper part of it (which is the diſtance between the two orifices) and in the orifices themſelves. Without all doubt the uſe of theſe Fibres is, whileſt they are contracted, to raiſe the bottom and ſides of the Stomach, and conſequently very much to ſtreighten the cavity or hollow of it, ſo that the meat or other matter therein contained, being elevated, may be diſcharged through this or that orifice. The outward, or convex ſurface of this fleſhy coat, together with the rank of moving fibres is exactly delineated in *Tab.*3.

But to determine its expulſive motion toward this or that orifice, and that the matter included in the Stomach, may be conveyed both by Vomit or Stool, there needs alſo another row of fibres, which in reſpect of the former, are tranſverſe, and draw one end of the Stomach, to wit, the right or left, toward the other, ſo that when both theſe kinds of fibres act at the ſame time, the Stomach being contracted in all its dimenſions, and raiſed up, may throw out what is in it through that orifice, to which upon occaſion it is inclined. And indeed, that there are ſuch fibres juſt under the former, is very manifeſt to any one that takes notice of the other, inner and concave ſurface of this Coat. Let therefore the Stomach be turned (through the orifice of the *Pylorus* being cut a little wider) with the wrong ſide outward, ſo that the inner and concave ſurface may become the outward and convex, and by that means the hairy covering of that inner membrane, together with the wrinkles and folds (as it is formerly deſcribed, and expreſſed very well in *Fig.*1. *Tab.*4.) will plainly appear. Then after a little dipping of it into boiling Water, let the hairy veil be taken off, and thereby we ſhall diſcover the nervous coat it ſelf, which is covered all over with veſſels that ſpread into an innumerable company of little branches: portions of both which I have taken care to get repreſented in *Fig.*2. *&* 3. of the ſame Table, that the ſurfaces of them, with the glandules and veſſels, whereby they are joined together, might be diſcerned. Laſtly, If you take the nervous coat quite off, the inner fibrous ſurface of the fleſhy or middlemoſt coat will appear, as it is lively expreſſed in the fifth Table. The order therefore in the branching of theſe fleſhy fibres is very obſervable, in that they ſeem to ariſe behind the mouth of the Stomach, and ſo encompaſſing its left ſide to be carried forward toward the right. A conſiderable number of theſe are conſpicuous in the neck or top of the Stomach, which running along in ſtrait lines on both ſides, go into the *Antrum Pylori*, or hollow of the *Pylorus*, and covering that cavity of it here and there, the whole length of it, are terminated in the very orifice, as is repreſented in the fifth Figure. But the other fibres of this rank go obliquely on both ſides of the Stomach, and forward toward its bottom, where they meet. The uſe of the former ſeems to be, to draw either of the orifices toward the other in diſcharging [what is within] whether upward or downward; for the ſame fibres pull either to the right or left, according as the attractive motion begins from the one or the other end; as I have lately ſhewn in my Treatiſe touching the motion of the Muſcles. If then the contraction begins near the *Pylorus*, [it ſo happens that] whileſt there the bottom and ſides of the ſtomach are gathered up by other fibres both outward and inward, the mouth of the ſtomach alſo is bowed toward the *Pylorus* by theſe ſtrait ones, to the end that what

The uſe of its Fibres.

The ſame fleſhy Fibres cauſe oppoſite contractions.

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what is in the ſtomach may be tranſmitted into the Guts. But if on the contrary the contraction begin in the other ends of theſe fibres near the mouth of the ſtomach, [it thereby comes to paſs that] whileſt the bottom, and ſides of it are drawn that way by other fibres, the *Pylorus* alſo at the ſame time is pulled toward it, as in vomiting. As for the other oblique fibres of this rank, when the motion begins from their right ends, they are contracted obliquely downward, and by their force incline the left part of the Stomach toward the bottom and the *Pylorus*, to preſs the meat (as it concocts) the nearer together, and roul it down that way: So on the other hand, if the motion begin at the left ends, that are contracted obliquely upward, making the bottom and right part of the Stomach yield toward the mouth of it, to give you a Vomit. Now according to both the contractions of theſe fibres, the fleſhy ones that are outward and make up the convex ſurface of the middlemoſt coat, do (as it were) conſpire in their action, and thereby rendring the cavity of the Stomach more ſtreight, make it the fitter for evacuation either upward or downward. Wherefore according as by the irritation or firſt motion in the one or the other part of it, the contraction begins near the *Pylorus*, or the mouth of the Stomach, the whole cavity thereof is drawn together, raiſed and bowed either one way or the other, to cauſe a diſcharge either upward or downward. Both ſurfaces of this coat, with the diſtinct rows of moving fibres in each of them, I have taken care to get exactly delineated by Figures in the third and fifth Table. It is not my buſineſs here to recite and explicate the ſeveral ſorts of contractive motions that this fleſhy coat of the Stomach performs, in that I have already ſhewn elſewhere of what kind thoſe are, which happen in convulſive diſtempers, and do deſign to demonſtrate the nature of thoſe that are cauſed by the operations of Medicins, when I come to treat particularly of them. Yet in the mean time I obſerve to you, that the inſtinct or occaſion of thoſe motions which this fleſhy coat uſes to perform, is communicated and given to it ſeveral ways; as firſt and chiefly from the nervous coat that lies under it; which as it is variouſly affected by that which is in the Stomach, does preſently provoke the fleſhy coat to contract it ſelf one way or the other, either to keep in or drive out the matter therein contained. But the nerves that are inſerted into this fleſhy coat infuſe into it ſeveral inſtincts or diſpoſitions to move down from the Brain or other parts, whether near or remote, below or above. And hence it is, that the Phanſie, Appetite, yea many Affections, [or indiſpoſitions] of the Soul, or of any parts of the Body, diſturb the Stomach and cauſe it to move different ways.

How the fleſhy coat comes to move.

The outmoſt coat of the Stomach is wholly nervous.

3. The outmoſt coat of the Stomach, which is common to that and the Weazon, I have already deſcribed, as to its ſubſtance and make: as to its uſe, it being the cover of the whole Stomach, inveſts or cloaths (as it were) the fleſhy fibres of the coat that lies under it, binding them with its fibres, as it were with twigs one to another. The fibres of this membrane are (as I before obſerved) in ſome places thicker than ordinary, to the end that when the Stomach is extraordinary full, it may be proportionably diſtended or ſtretched out. Theſe ſeem to ſerve but very little for motion, but for ſenſe they do in ſome meaſure: though indeed there is mighty little uſe of it, becauſe no outward object, nor any thing that is taken in at the mouth can reach it. But if the ſerous Humour [or wheyiſh moiſture] an abſceſs [or irregular gathering of any ill Humour] or a conſtant flux of choler happens in the adjacent or contiguous parts, it cauſes almoſt a continual nauſeouſneſs, want of appetite, and frequent vomiting in the Stomach, by reaſon that this coat is often and much diſturbed, as I have obſerved in many Bodies which I have diſſected. Now the chief uſe of this coat is, that being a cover to the whole Stomach, it inveſts or cloaths the fleſhy fibres of the membrane under it, ſupports the branches of the veſſels, and ſerves to ſtrengthen the Stomach as well as to preſerve the heat thereof. Nor is it improbable, but that in ſome places the nervous fibres of this coat, in reſpect of the fleſhy fibres that are under them ſupply the room of tendons.

The uſe of it.

Two orifices in the Stomach.

The Stomach being made up in this manner, like a Snapſack, of theſe three coats, as it were a three-doubled piece of cloth, hath two doors, or orifices, which are placed on the top of it, juſt againſt one another. The one on the left ſide, conſiſting of the Weazons inſertion into the mouth of the Stomach (and looks like the Pipe of a Funnel put into the neck of a Bladder which is to be filled [with any liquor] that ſtreight and perpendicular paſſage whereof, lets every thing that is taken in and ſwallowed, into that part. The other orifice is on the right hand, continued to the *Duodenum* [or Gut of 12 inches long] by a long, oblique aſcent, and by degrees diſcharges the Chyle that is prepared in the Stomach, into it.

Nervus belonging to the mouth of it.

The nerves of *Par Vagum* [or the ſtraggling Pair] being brought down to the Stomach, as their ultimate bound or limit, make, near the left orifice, very notable plaits,

or

or a kind of Network, which covers it all over: and ſo likewiſe the hairy and nervous coat of the Weazon inveſts and clothes the cavity of it pretty deep: from whence it proceeds, that the mouth of the Stomach being a part of very acute and exquiſite ſenſe, hath ſuch a communication with the other noble parts, and eſpecially with the Brain and Heart; ſo that it is not without ſome reaſon that *Helmont* makes this the ſeat of the Soul. *Phar. Rat.* Part I.

A deſcripſion of the Pylorus.

The other orifice, commonly called, the *Pylorus*, going from the right ſide of the Stomach with a long wide hollow, that grows leſs and leſs by degrees, till it becomes very ſtreight, ends in a ſmall hole, from whence being retorted, or turned back again, it is continued, or joins to the *Duodenum*. The coats in this part are much thicker than in any other part of the Stomach. Of which the inmoſt being nervous, hath many uneven wrinkles and furrows in it, and at the very hole is raiſed into an oblong bulky figure (like a Cock in any Veſſel) to the end that the Chyle when it is gone leiſurely out of the Stomach, may not rejounce again into the Stomach. The fleſhy coat, as in all other places, hath two rows of fibres; for ſome of them encompaſſing and binding this Hollow, do upon occaſion ſhut it, whileſt others running out in length all over its ſides, and gathering the other parts of the Stomach upward, draw them toward this orifice. And ſo on the contrary, theſe fibres, when the contraction begins at their other ends, do often draw the Pylorus toward the left orifice, as in Vomiting: but when the attractive force is augmented and carried farther, the Duodenuuu is drawn upward and thereby the choler with the Pancreatick liquor [or humour in the Sweetbread] is diſcharged into the Stomach.

The uſe of the Pylorus.

The uſe of the *Pylorus* is not onely to tranſmit that which is in the Stomach freely and in a great quantity to the Guts (as it often does in a Purge or Looſneſs) but rather to receive the Chyle, when it is well prepared, and having for ſome time retained it, by little and little to ſend it forth. For the long and wide hollow thereof ſeems to be a kind of retiring room where the more perfect part of the chyly maſs may go apart and ſtay, till the other and more crude part, which is more newly taken in, be better digeſted in the bottom of the Stomach. Hence it is, that among thoſe things that we eat, we oftentimes quickly vomit up what is ungrateful, whileſt the more grateful part of the food ſtays in the Stomach; in as much as there are in the Stomach ſeveral diſtinct cells, or little rooms, wherein the parcels of meat may retire and ſtay apart from each other. Beſides which it is obſervable that Vomits when they work gently, provoke or move onely thoſe parts that are next the left orifice of the Stomach, but when they operate more ſtrongly, draw the *Pylorus* alſo, and the *Duodedenum*, which is joined to it, inward and upward, and by that means cauſe an evacuation of the choler which is violently hurried into the Stomach.

The veſſels of the Stomach.

The Veſſels belonging to the Stomach are Nerves, Arteries, and Veins: of which the former are deſcribed pretty accurately in my Book called *Neurologia*, or a Treatiſe of the Nerves; that is to ſay, That the Nerves of the *Par vagum* on both ſides ending in the Stomach, make notable branches and plates in it; as likewiſe, that the nervous plates of the *Par intercoſtale* [or Pair running between the ribs] being ſpread here and there in the *Hypochondria* and the lower Belly, ſend many ſprouts, and thoſe very conſiderable ones too, to the ſtomach: Which is the Reaſon that in Fits of the Mother, the Cholick, and Hypochondriack diſtemper, people ſo often vomit.

Nerves.

Bloud-veſſels in abundance.

There are alſo a great many Bloud-veſſels belonging to the ſtomach; as you may plainly ſee, if you take the ſtomach of a Man, a Dog, or an Hog, (having firſt tied and cut off the cæliack veſſels) and then tying up the orifices, blow it full of wind; for then you may ſee with a great deal of pleaſure the leſſer trunks of Veins and Arteries (inſerted partly into the top of the ſtomach and partly into the bottom of it) which being immediately divided into leſſer branches, and afterwards into moſt minute ſprouts meet one another, mutually embrace, and being expanded every way, creep all over the ſtomach, and cover it with a ſhrubby ſort of hair. Theſe Bloud veſſels, going inward, and being at laſt divided into a thouſand little ſprouts, are terminated in the innermoſt nervous coat, whoſe inner ſurface they dye, as it were, of a Bloud colour, by the thickneſs of thoſe points, in which the veſſels end. And this is plain, if at any time the hairy coat be ſeparated after the dipping of the ſtomach into boyling water; for then the nervous coat by reaſon of the extraordinary thick terminations or endings of the veſſels will ſeem to be covered as it were with a ſmall Net of bloud.

Their uſe.

If their uſe be inquired into; all thoſe who make heat the chief inſtrument of concoction and digeſtion in the ſtomach, may have fewel enough from hence; in that the Bloud boyling up about the bottom and ſides of the ſtomach, as it were a pot, is kept perpetually like a fire, and that lake of Bloud ſeems to be placed there partly for that end. But yet theſe bloudy veſſels have an other office too, which I eſteem as neceſſary as this; and that is, that the Arteries diſcharge ſome humour into the ſto-

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mach, and the veins continually carry thence another sort of moisture, so that there is an immediate and a constant commerce between the chyle and the bloud.

The Arteries bring into the Stomach a fermenting humour.

But that the food taken in may be not onely concocted, but also dissolved, and that much better by fermentation, so as to be digested to homogeneous chyle, it ought to be impregnated there with a kind of spirituous liquor which is like a Ferment [Rennet or Leaven] (as when Ale Yest or Balm sets other Ale a working) and such an humour or liquor (where plenty of it is necessary) the Arteries onely can supply; which when it is mixed with the reliques of the Chyle that stick in the hairy Veil, doth questionless make that juice, commonly called the ferment of the Stomach. Moreover since it is necessary oftentimes that a man should be suddenly refreshed by what he eats, since that cannot be done by the long windings of the Guts and chyliferous vessels, what is more likely than that the Veins which lie very thick and wide open, do receive the more subtile part of the Chyle, and immediately convey it into the bloud. You may see very plainly in the first Figure, how these Bloud-vessels, being inserted into the bottom and top of the Stomach, cover its whole surface with very thick and numerous branches.

The Veins take in some part of the Chyle.

The Guts are either small or great.

Thirdly, From the Stomach we descend to the Guts, which being of two sorts, either small or thick, I shall not need in this place to give you an account of them all, because both their number and figure is already so well known, not onely to Anatomists, but even to common Butchers. In the former, for as much as concerns the operation of Medicins, we ought to consider, First, their situation and make; Secondly, their Coats; and thirdly their Vessels and Passages. It is their business to receive the Chyle after it is prepared in the stomach, to give it a new fermentation, and to draw from it, when more elaborate and perfect, a nutritive juice into the chyliferous Vessels. In these Guts chiefly do purging Medicins work.

The situation and dimension of the small ones.

Now though there be but one continued passage of the small Guts, yet by reason of the distinct offices which they bear, there are as it were, three stages in it, and as many distinct names assigned to them, as if they were three several Entrals. In the first of these, the Chyle descending from the *Pylorus*, is presently mixed with new ferments, to wit, the Choler and the Pancreatick or Sweetbread-juice, with which, since the whole mass of it ought by degrees and parcels to be impregnated, therefore every part of it passes this region, to wit, the *Duodenum*, with a speedy motion. In the next place, that is to say, the *Jejunum* [or hungry Gut] the Chyle by being fermented, grows more perfect, is rescued from acidity, and gains a greater volatility [or lightness] but seeing it ought not to stay long here neither, it is presently fermented, and being carried farther, leaves this passage oftentimes empty. Then in the third cavity, the Chyle being volatilized [or lightned] and quite perfected, is plentifully gathered together, and stopped for some time; and whilest the Gut called *Ileon*, being so full of Chyle, is a little compressed by the fleshy fibres, the purer and subtiler part of it, which is to be transmitted into the bloud, is squeezed into the milky vessels (and in my opinion, into the Mesaraick veins too) so that at length the remaining fœces or dregs, which are almost quite robbed of all their vertue, are thrust on into the great Guts.

Three Coats of the Guts.

All these small Guts, that is to say, the whole train of them, have the same Coats, and those of the same make too; not much different from the membranes of the stomach, unless in this, that they are somewhat thinner. All the Guts both small and great (except at the beginning and end of them, and some part of the Colon which is fastned to the *Omentum* or Kall) are connected to the rim of the Mesentery, which is as it were exactly round: at which, in the mean time, a man would wonder how they, though they are about six Ells long, could be comprehended by that circumference which is onely one span from its center. But in this case you must observe that the plain [body] of the Mesentery being gathered into many great folds, is in its circumference near three Ells about; and then, that the same circumference, in order to its contracting the length of the Guts, contains, in every hands breadth, about twelve hands breadth of Guts. And as it ought to have been so for many other reasons, so especially for this, that the Guts might not onely lie in a small narrow space, distinctly and without confusion; but likewise that they might move with a slow, successive motion, and as it were creep from one end to the other. For the tendons of the motive or moving fibres, whereby the passages or cavities of the Guts are contracted, are placed in the border or rim of the Mesentery, and from this Entral doth the original instinct of every motion in the Guts proceed; as I shall more clearly shew you by and by: In the mean while let me go on and discourse of the Coats of the small Guts.

How they are fastned to the Mesentery.

The inmost Coat of the small Guts.

The innermost of them hath a great many wrinkles, that go athwart it; which being also movable, are, as it were, so many lets to the Chyle, and conduce to the moderate retention or staying of it; lest it should flow away too soon to the great

Guts

Guts and the very Excrements, before it is ſufficiently perfected or prepared and ſqueezed out. Thoſe wrinkles are there, as *Fallopius* hath well obſerved, by reaſon that this inmoſt Coat is much longer than the outward one, and ſo is curled as it were, and wrinkled. For if that be ſeparated from this, and thoſe folds laid open, it will be found to be full thrice as long.

This Coat is nervous and covered with an hairy veil.

Moreover this inner Coat being altogether nervous, and containing in it the mouths of the milky and the bloudy veſſels, is covered on the inſide with ſuch an hairy veil as the Stomach is, and for the ſame uſes, in my opinion: to wit, this covers and defends the mouths of the veſſels, receives the firſt acceſſes of the Chyle and all things therein contained, delivering it over by degrees to the nervous coat. But this Coat conſiſting of all kinds of Fibres, and being the innermoſt Chamber as it were of the inteſtinal paſſage, or way through the Guts, ſerves very much for ſenſation, and according to the impreſſions made upon it, moveth the fleſhy coat that is over it, to the performance of expulſive motions, either ſlow or quick, downward or upward, though it is but ſeldom. If at any time either the inner ſurface of this coat is pricked, or ſtimulated by ſharper things than ordinary, or that diſagreeable humours fall upon its fibres, great pains and gripes proceed from ſuch pungent cauſes. Beſides, this nervous coat is found to be very obnoxious not onely to diſtenſions [or being ſtretched out] by wind incloſed in it, but alſo to expanſions [or widenings] and ſwellings through the violent diſcharge or exploſion of the Spirits that are in its fibres. But beſides theſe nervous fibres, of which ſo variouſly interwoven it conſiſts, it is likewiſe covered all over with very thick and numerous branches of bloud-veſſels that terminate in it, juſt as I obſerved the Stomach was. From whence we may conjecture, that the Arteries, it may be, diſcharge (and that in moſt parts) a kind of rejectaneous, or baſer moiſture into the cavities of the Guts, and that the Meſaraick veins as well as the milky veſſels do there receive ſome part of the Chyle, and carry it more immediately into the bloud.

There are alſo a great many bloud-veſſels in it.

The fleſhy or middle coat. In which there are two orders of moving fibres, right and circular.

2. The ſecond or middlemoſt coat of the ſmall Guts is ſomewhat thicker, and altogether fleſhy. There are in it two ranks of moving fibres, the one under the other; of which the firſt and innermoſt is annular [or like to rings] and incompaſſing the whole paſſage or cavity of the Guts all over with thick rows, is inſerted into the rim of the Meſentery, as it were, into a tendon. The other rank of fibres is of ſtrait ones, or ſuch as run out into length; which, being above the others, and cutting them at right angles, go all the length of the Guts; and to them the outmoſt coat ſeems to ſerve in ſtead of tendons, becauſe it being altogether nervous, or as it were, tendinous, is ſpread over all that row of fibres.

Their uſe.

As to their uſe; ſeeing it is the buſineſs of the Guts to puſh forward the Chyle and Excrements from one part to another, and ſo by degrees ſtill on, till at laſt they have thruſt them quite through their whole paſſage; and likewiſe (whileſt they themſelves are contracted and ſhortned ſo, as to be ſtreightned in their cavities) to ſqueez and preſs the more ſubtle part of the Chyle into the milky veſſels and meſaraick veins, it is obvious to conceive, how the aforeſaid fibres perform both theſe offices: for when the circular fibres being contracted ſucceſſively or in order, diminiſh the depth of the Guts, and at the ſame time the long-way fibres being bloated and ſwollen, make them ſtill more ſtrait and ſhorter withall, it muſt of neceſſity follow, that what is in theſe Entrals, being preſſed behind, muſt be ſtill puſhed forward.

But yet you muſt not think, that the contractions of both theſe ſorts of fibres are ſo great and continual, as that all that which is in the Guts is moved from one part to another at the ſame time (though I do believe that in a Purge or Lask it doth ſometimes ſo happen) but that ordinarily, thoſe light and interrupted, though regular and orderly contractions, being often repeated, do as it were, jog the Guts and cauſe the Chyle with the Excrements to move gently from place to place. But by ſuch jogs of the Guts, and thoſe repeated contractions, the Chyle being continually in motion is rendred more perfect and flows more eaſily into the veſſels, that gape to receive it. Now if it be asked, how or by what means both theſe ſorts of fibres aforeſaid, are put upon ſuch a motion, and determined to contract ſometimes theſe, and ſometimes thoſe parts in order, I anſwer, that it is in the Guts as in the Stomach; that is, that in both of them the motions of the fleſhy coat depend upon the ſenſe of the nervous one, ſo that according as this is irritated or provoked, that is, contracted. And therefore whenever any diſagreeable object makes a ſad impreſſion upon the nervous fibres, immediately, for removing of that, the motive fibres contract the indiſpoſed or affected part of the Guts, that they may eaſe them of all moleſtation and trouble.

Their motion proceeds from the irritation of the nervous Coat.

How the nervous fibres come to be irritated.

The nervous fibres are irritated or provoked to motion ordinarily and gently, Firſt, By the reliques of the Chyle, which, when the purer juice is ſufficiently ſtrained out,

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become effœte [or without any vertue in them] and troubleſom; for as long as the diſtribution of the Chyle laſts, the moving fibres, being contracted before, will not ſuffer it to glide forth too haſtily, but afterward, by contractions behind, they thruſt it out as a thing of no uſe. Secondly, The nervous fibres are a little too ſharply irritated by the choler and Pancreatick juice iſſuing out of their ſeveral paſſages, and likewiſe by humours that are ſharp and pungent, poured in out of the Arteries; which cauſe greater and more frequent contractions in that part. Thirdly, there is another cauſe of this irritation [or provocation to motion] in theſe fibres, which is yet more vehement and preternatural, and that is from diſagreeable or diſproportionate food, as alſo from Medicins and Poiſons, of which Medicins I ſhall ſpeak particularly in the ſucceeding part of this Book.

Beſides, the fleſhy and motive fibres of the Guts are ſometimes ſtirred up to ſuch contractions as looſen the Belly through other cauſes more remote. For oftentimes violent paſſions or diſorders of the mind or body bring a Looſneſs or *Diarrhœa* upon a Man; that is, when the Spirits that are in the Brain, or other principal parts related to the nervous family, are extraordinarily diſturbed, they forthwith transfer all their own diſorders through the paſſages of the nerves, or nervous ſprouts and branches, to the Spirits that inhabit the Guts, and ſo move them by contraction to thruſt out their Excrements. After irritation, however it be cauſed, there always ſucceed contractions, in that the animal Spirits guſhing violently out of the tendinous rim of the Meſentery into the annular fibres, and likewiſe out of the tendinous fibres of the outmoſt coat into the fleſhy ones that run lengthwiſe, doth ſo bloat and ſwell both ſorts of them, that they thereby render them more contracted and ſhorter. It would be too much beſides my deſign, in this place to ſhew what part the Meſentery bears in the performing of this periſtaltick, or expulſive motion of the Guts; for beſides that the tendons of the circular fibres are rooted in the rim of it, you may alſo obſerve, that in the plain of it, the motive fibres go ſtrait from the center to the circumference: of which there can ſcarce be invented any other uſe, than that they being contracted in ſeveral parts, according as occaſion is given, may cauſe the ſame contractions in ſuch and ſuch parts of the Guts.

How Contractions ſucceed irritation.

Of the outmoſt coat of the Guts I need not ſay much, becauſe this coat ariſing from the *Peritonæum*, or inner rim of the Belly, and being ſpread over the former, as likewiſe altogether nervous and very thin, it is commonly taken to be onely a cover to the reſt: but beſides that, I have reaſon to believe, that ſince the ſeveral rows of lengthwiſe fibres are immediately under this coat, and none of their tendons are found any where elſe, this coat is really tendinous, and that the animal Spirits guſh out of the nervous fibres thereof, according to the contractions of thoſe fleſhy ones, but return again as ſoon as the motion is over.

The outmoſt Coat of the Guts.

The veſſels and paſſages belonging to the ſmall Guts are the conveyances either of Spirits or Humours. Of the former ſort they reckon the Nerves with their plates and branches, all which I have treated of at large in my Book called *Neurologia*, or a Treatiſe of the Nerves. As to the other paſſages, they either carry Humours to the Guts, as the Paſſage of Bile or Choler, the Sweetbread paſſage, the Arteries, and in ſome meaſure the Nerves too (as I have elſewhere ſhewn in a Diſcourſe of the Colick) or they carry and export humours out of the Guts, as the milky veſſels and meſaraick veins. Now every one of theſe Paſſages, with the Spirits and Humours that are in them, and likewiſe ſuch as are contained either in the cavities of the Entrals, or reſide in their nervous or fleſhy fibres, are either the ſubjects or objects of *Pharmacy*, or Practical Phyſick, and are uſually firſt and more immediately moved or affected by the operations of all Medicins whatſoever: but after what manner, I ſhall endeavour to ſhew in the particular examination of every ſeveral kind of Medicins.

The Veſſels and Paſſages belonging to the Guts.

Of the Bilar and Pancreatick Paſſages, ſince Authors have already ſaid ſo much of them, and yet the truth is not exactly known even to this day, or at leaſt is in diſpute, it will not be pertinent or convenient for me to raiſe an argument in this place, which muſt of neceſſity be very prolix and intricate, or tedious and entangled. How Vomits and Purges work upon theſe parts, I ſhall ſhew hereafter.

As for the Bloud-veſſels, it is a common obſervation, that a vaſt number of Arteries and Veins are ſpread into branches all over the Meſentery, and that from thence there is an infinite company of ſprouts diſtributed to all the Guts. Of which I have likewiſe taken notice, that being inſerted into the outmoſt coat, they beſtow but few of their ſprouts upon that coat, but that almoſt all their greater branches, going ſtrait into the Guts come back into the inner coat, in which they are terminated, and ſend forth an extraordinary quantity of ſmall ſprouts, which cover the ſurface of it.

A great many Bloud-Veſſels in the Guts.

Now

Now upon this conſideration a man would wonder, why ſo much bloud ſhould be deſigned to flow into theſe Entrals, that of themſelves are almoſt bloudleſs. It is not likely that the onely reaſon of it is to ſupply heat and nouriſhment, ſince the muſcles and outward coats of the Guts, which have need of greater plenty of ſuch veſſels, are yet content with a leſs number. The famous *Mabius* (to untie this knot) affirms, *That Nature hath placed ſo many Arteries in the Guts, that in an Embryo, the Excrements of the Mothers Bloud wherewith at that time it is nouriſhed, might be diſcharged into the inteſtines.* And he gives the reaſon of it, which is, *Becauſe the Guts of an Embryo or Infant new-born, contain in them a blackiſh excrement.* But indeed this argument is eaſily anſwered, if we grant (as we ought to do) with *Harvey* and other Neotericks or Modern Phyſicians, that an Embryo in his Mothers womb does ſuck and receive a nutritive liquor at his mouth. And yet my opinion is rather, that thoſe Arteries in adult Animals do often times purge forth the groſſer parts of the bloud (which by ſweat, and other ways, are unapt to paſs) through the Guts as through a Sink. But that in the mean time the Veins do receive ſome part of the Chyle, and having preſently reduced it, mix it with the Bloud.

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The reaſon of it.

Concerning the great Guts, in relation to the practice of Phyſick, I ſhall not need to ſay much in this place, becauſe the virtue of Medicins taken in at the mouth is almoſt quite ſpent before it comes to thoſe Entrals; in ſo much that the irritation or cauſe of motion in them, ariſes partly from conſent with the upper Guts, and partly from the violent expulſion of what is in them, rather than from the Medicin it ſelf. They have the ſame coats as the ſmall ones; and ſeeing that in the Colon the excrements aſcend ſtrait upward, there is a neceſſity for ſtronger fleſhy fibres to make the motion of contraction the more forcible. For which reaſon, if there happen an inflammation or impoſthume (as I have often known it hath) about the beginning of the Colon, ſo that the fleſhy fibres being hurt, cannot perform their contractions to raiſe their excrements upward, the excrements ſtop, and lie toward the *Ileon*, which cauſes the *Iliack* paſſion, beyond all cure. Moreover in this Gut there are likewiſe framed thoſe arched cavities or chambers, as it were to the end, that the excrements being thereby longer kept in, the trouble of going too often to ſtool might be prevented. The Phyſick that belongs to this part conſiſts principally in Clyſters. But in ſome People the inner coat of the Colon is ſo very tender and ſenſible, that if you give them but a gentle Clyſter, the ſpirits are preſently in a combuſtion, and being exploded or diſcharged within the nervous fibres, blow up and ſtretch the membranes to the utmoſt degree, and thereby create very great pains in the whole Belly. What I have ſaid juſt now concerning the expulſive motions of the Entrals that depend upon the contractions of the fleſhy fibres, will more plainly appear, if you conſult my Hypotheſis, not long ago publiſhed, concerning the frame and motion of a muſcle. All that is more to be done, I have taken care, for the better illuſtration of the Anatomy of theſe parts, to get the Figures of them exactly delineated by a very skilful Artiſt and placed here hard by; and though in the deſcription of the Stomach, with the Weazon and Guts, I have followed *Fallopius* and other Ancient as well as Modern Anatomiſts, who aſſigned them onely three coats; yet if you ſeparate theſe coats ſomewhat more carefully than ordinary (after they are dipped in boyling Water) there will appear four very diſtinctly. For the hairy covering, which is eſteemed onely as an excreſcence of the nervous coat, is a pretty thick and peculiar membrane of it ſelf, and by reaſon of thoſe numerous glandules which are upon its outward ſurface, may properly be ſtiled the glandulous coat, as it manifeſtly appears by the Figures.

Of the great Guts.

The Explications of the Figures.

The firſt Table repreſents a Mans Stomach taken out and blown up, with the Veſſels full of Bloud; ſo that all the Arteries and Veins, with their branches (which are truly and exactly delineated) may be plainly ſeen.

A *The Weazon.*

B *The mouth of the Stomach, where the moving fibres of the Weazon, which are oblique upward, become ſtrait by reaſon of the ſudden ſhutting and opening thereof.*

C *The orifice of the Pylorus, with the Duodenum joined to it.*

D D *Part of the Duodenum, whoſe fleſhy fibres do there appear thicker under the outmoſt Coat.*

F F to C *The* Antrum Pylori, *or Hollow of the Pylorus.*

G G *The top of the Stomach, where the Bloud-Veſſels are inſerted and deſcending, ſcatter their Branches and Sprouts every way.*

Phar. Rat. Part. I.

H H H *The bottom of the Stomach, into which the Bloud-Veſſels being inſerted, do in their aſcent, diſperſe thick numerous branches and ſprouts to every part of it.*
I I I *The mutual inoſculations and wonderful communications between the Veſſels of each inſertion.*
K L *The right and left end of the Stomach.*

The ſecond Table expreſſes the outmoſt coat of a Mans Stomach, which is altogether nervous; whoſe nervous fibres running out the whole length of it, cut the outward fleſhy ones that are under them almoſt at right angles.

A *The Weazon, in whoſe outward Coat all the nervous fibres go ſtrait downward, and croß the fleſhy ones that are under them obliquely.*
B *The mouth of the Stomach.*
C *The Pylorus with its Antrum or Hollow,* D, *and part of the Duodenum joined to it,* E.
F *The top of the Stomach, where the Bloud-Veſſels appear in very great numbers.*
G G G *The nervous ſmall fibres that go all along the Stomach from one orifice to the other and on both ſides.*

The third Table ſhews the Stomach of a Man ſtript of its outmoſt nervous tunick or coat, that the outward or convex ſurface of its middlemoſt coat, together with the fleſhy fibres thereof, may appear.

A *The mouth of the Stomach, into which the Weazon* a a a *is inſerted; which alſo the circular fleſhy fibres* b b b *encompaß, and, upon occaſion, being contracted, cloſe or ſhut up.*
B *The Pylorus with the Duodenum joined to it.*
C *The orifice and cave or hollow of the Pylorus, both which are ſtreightned by circular fibres (whileſt they are contracted) and thereby (I ſuppoſe) ſhut up or cloſed.*
D D D *The circular fibres that encompaß the whole Body of the Stomach in depth.*
E E E *The top of the Stomach, where thoſe fibres ariſe, and being contracted, draw the whole frame of the Stomach, which they very much ſtreighten, toward it.*

The fourth Table; whoſe firſt Figure ſhews the whole Stomach, with the inner, concave ſurface, changed into the outward and convex, that the hairy veil or covering, with thoſe wrinkles and folds that go all over the Stomach, may come in view.

A *The left orifice, or mouth of the Stomach.*
B *The Cave or Hollow of the Pylorus, in which the coats are thicker than ordinary.*
C *Its orifice, by which it is faſtned to the Duodenum.*
D D *The top of the Stomach between the two orifices.*
E E E E *The ſides, ends, and bottom of it, in which the hairy veil of the inner Coat, and therein the wrinkles and folds, or furrows, are lively expreſſed.*

Figure II. repreſents a part of the Nervous Coat, in which, the hairy covering being taken off, the inner or concave ſurface, together with a thick and numerous company of branches of Veſſels doth appear.

Figure III. Shews a part of the hairy or glandulous coat, in which the outward ſurface, whereby it is connected to the Nervous Coat, is apparently very full of glandules and mouths or orifices of veſſels.

The fifth Table ſhews the inner and concave ſurface of the fleſhy coat, turned with the wrong ſide outward, that the other row of moving fibres may come in view.

A *The mouth of the Stomach, near which the row of fibres ſeems to ariſe, and is carried forward, partly in right lines, and partly in oblique ones.*
B B B *A notable company of fibres, which encompaſſing the mouth of the Stomach, above the neck or top of it, go toward the Pylorus, and covering the cave or hollow of it all along, are terminated in the orifice.*

D *The orifice of the Pylorus.*
E *The Cave, Den, or Hollow of the Pylorus.*
F F F F *Other fleſhy fibres, that running obliquely from the left ſide of the Stomach to the right, deſcend to the bottom of it.*

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Tab. IV. part 1st

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Fig. 2.

Fig. 1.

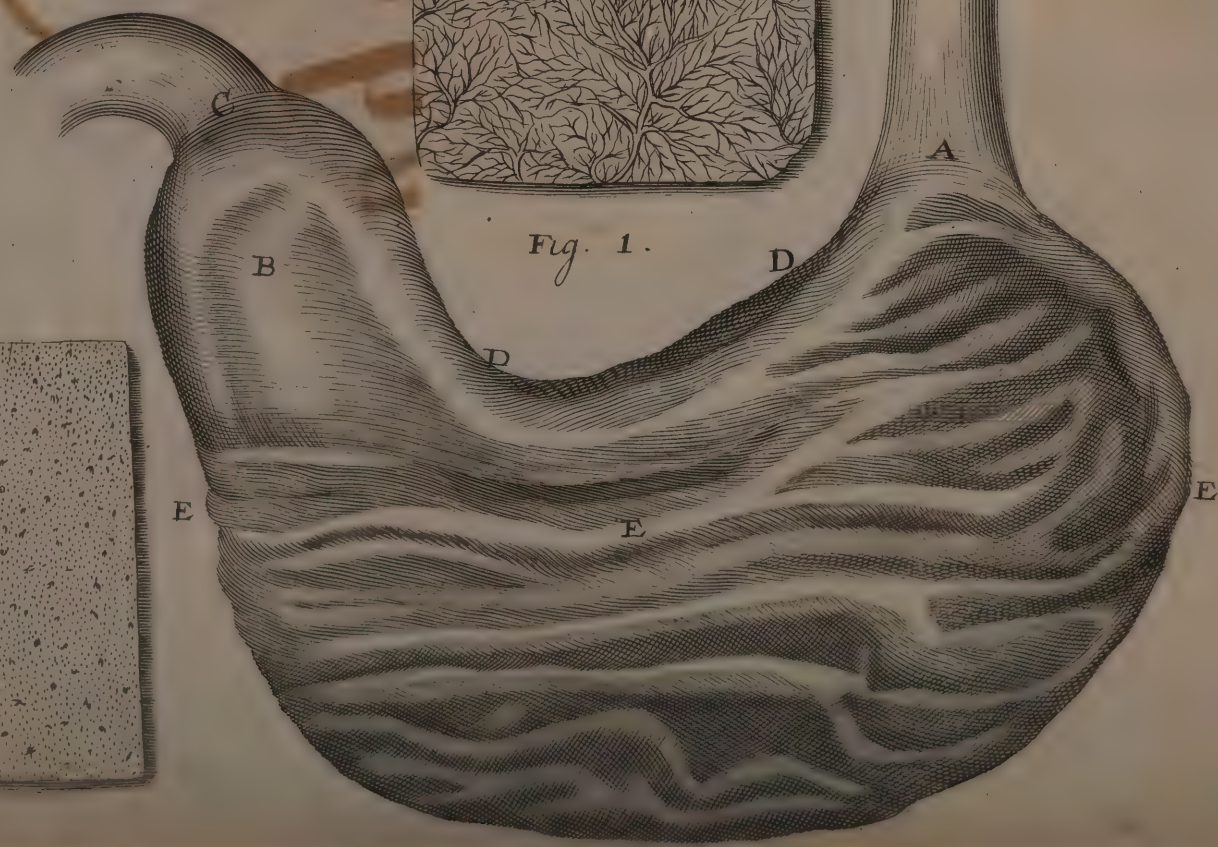
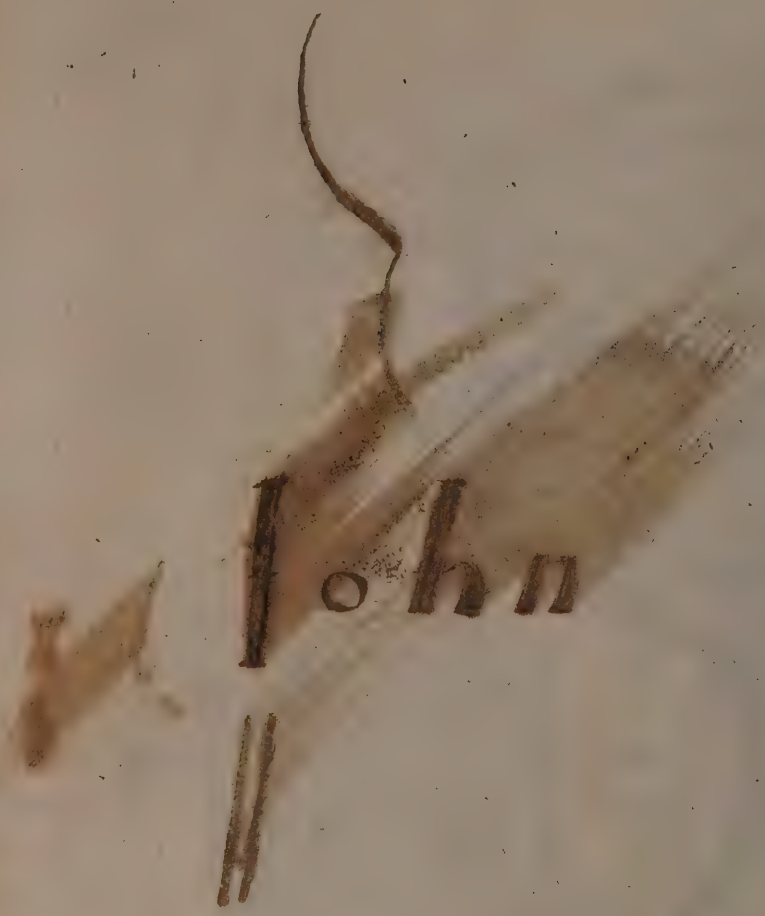


Fig. 3.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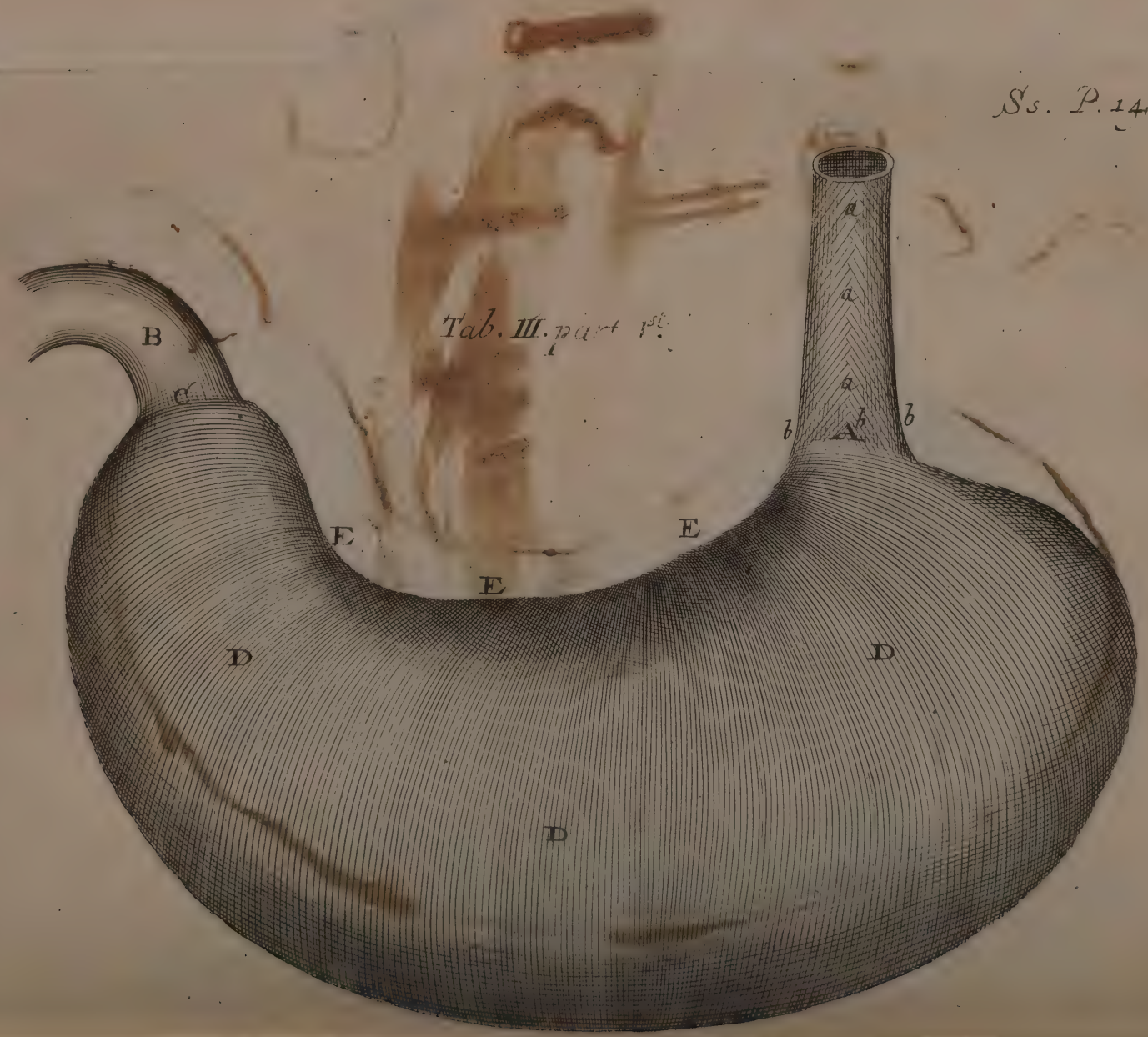

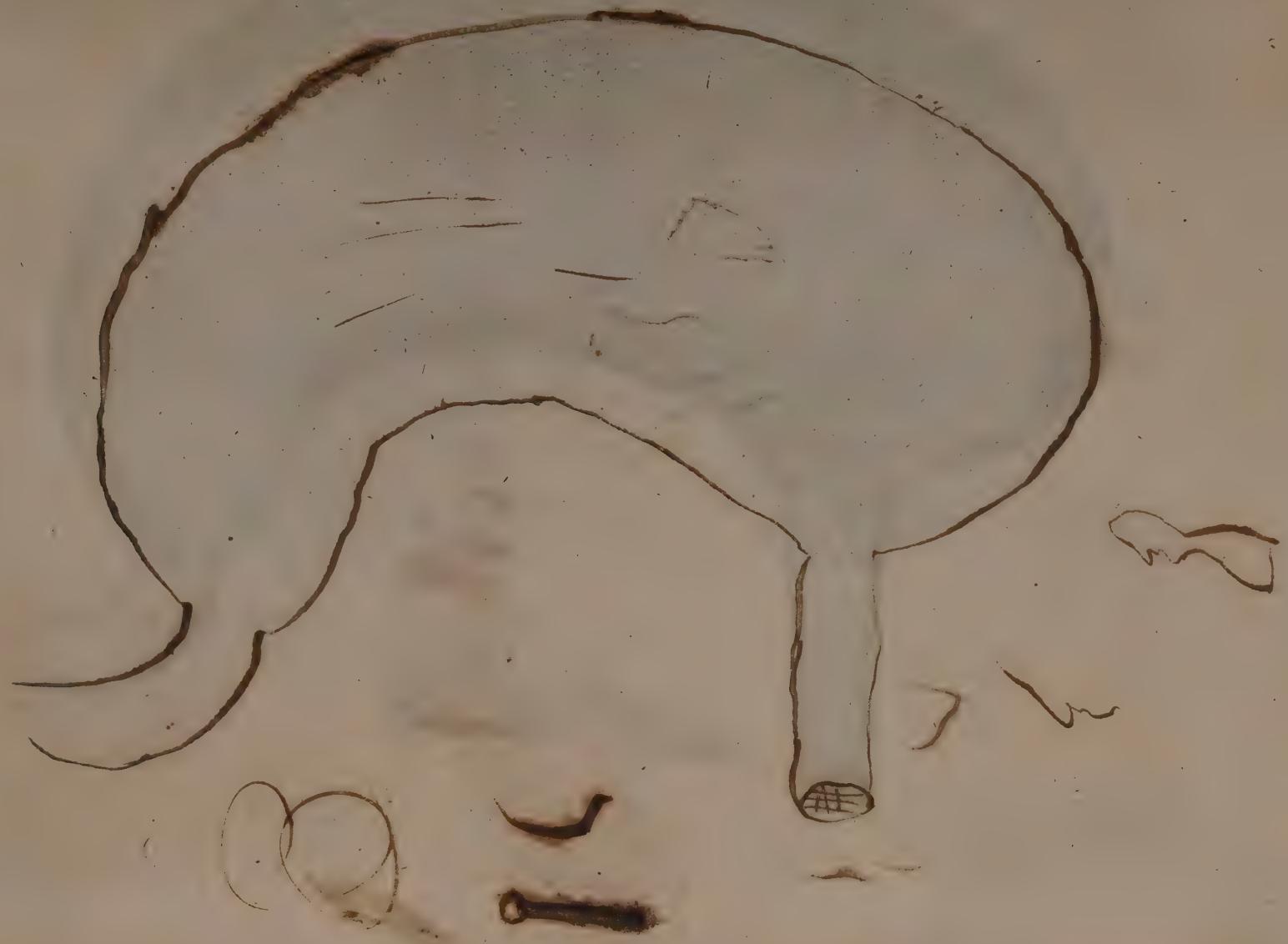

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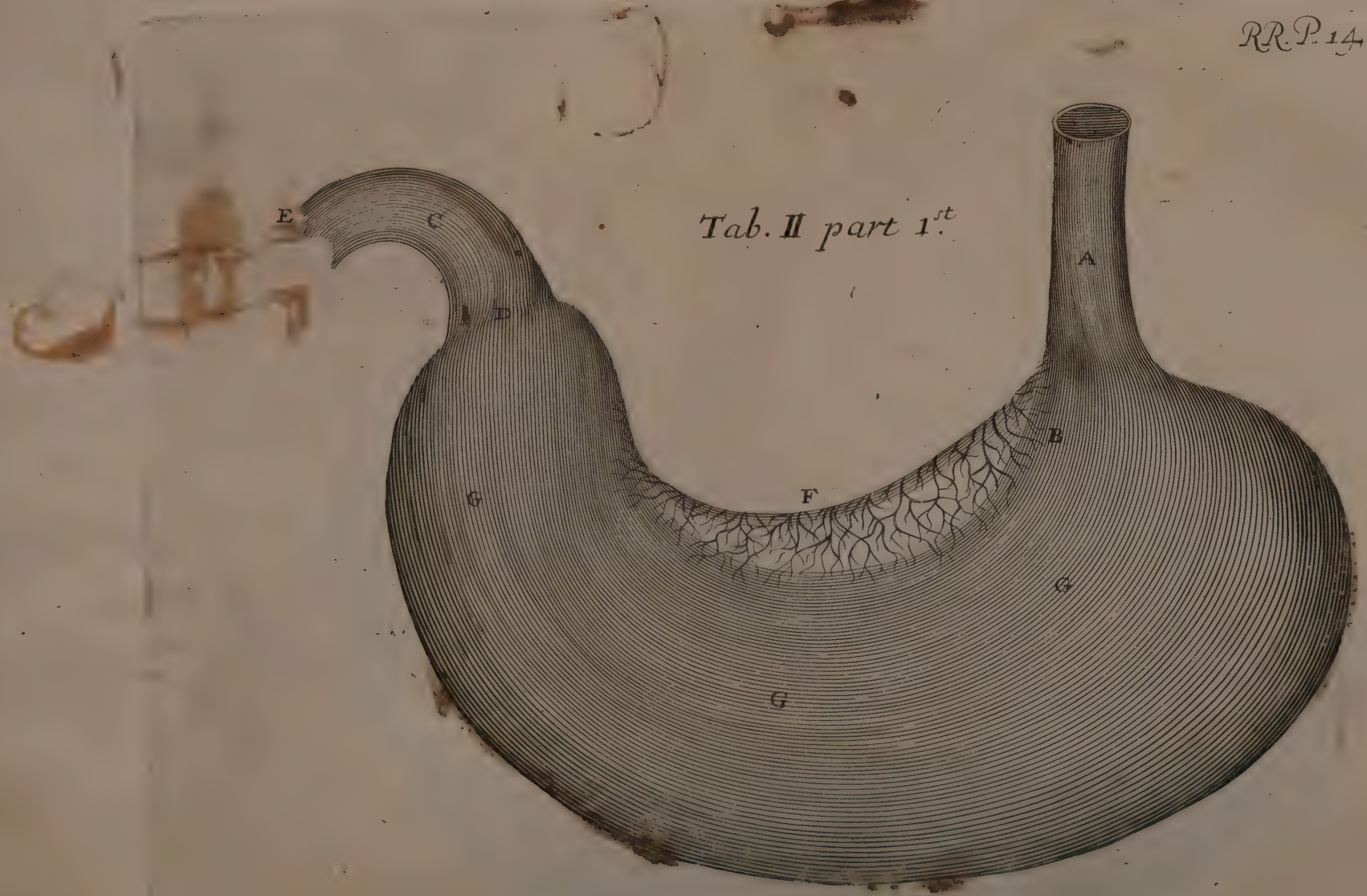

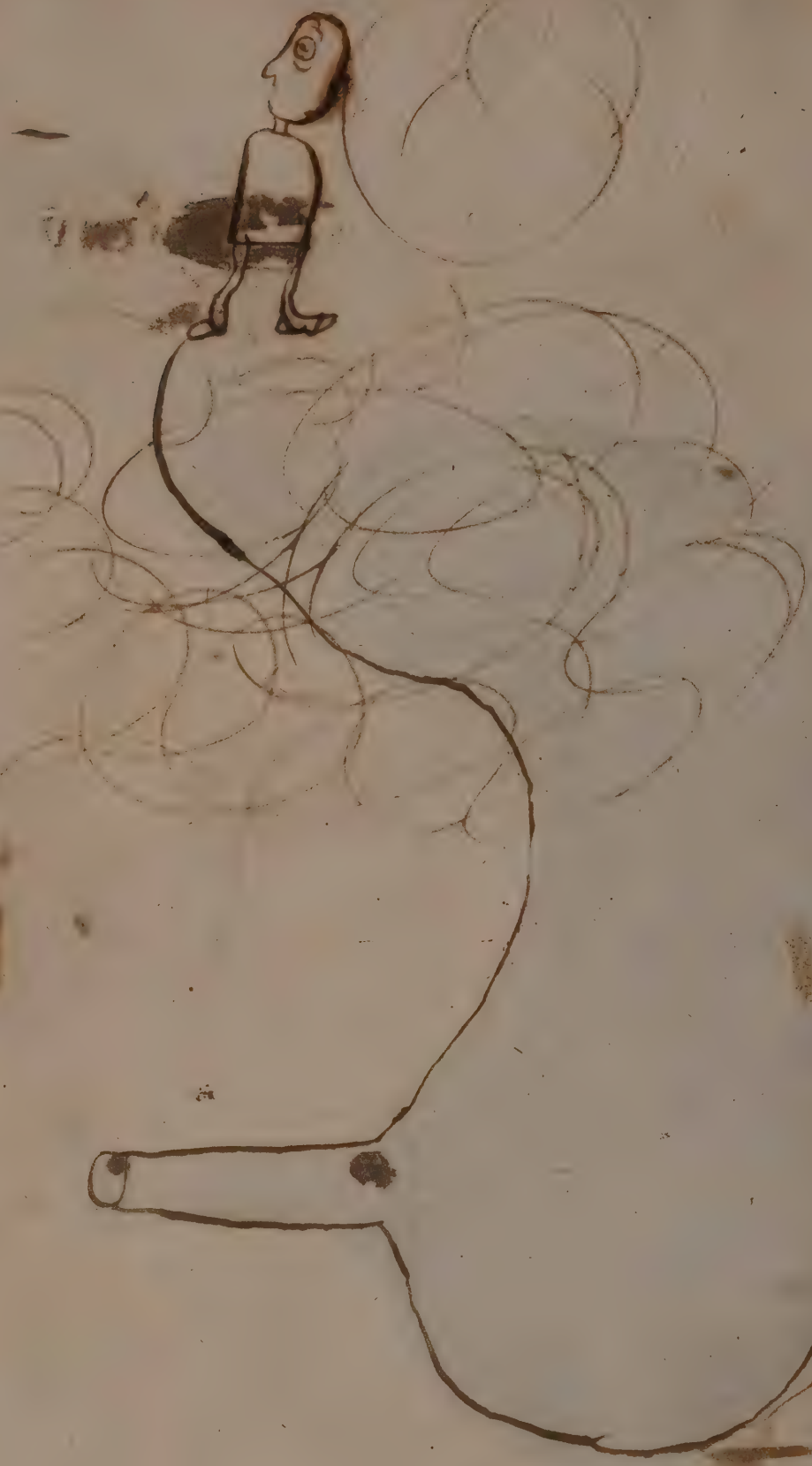

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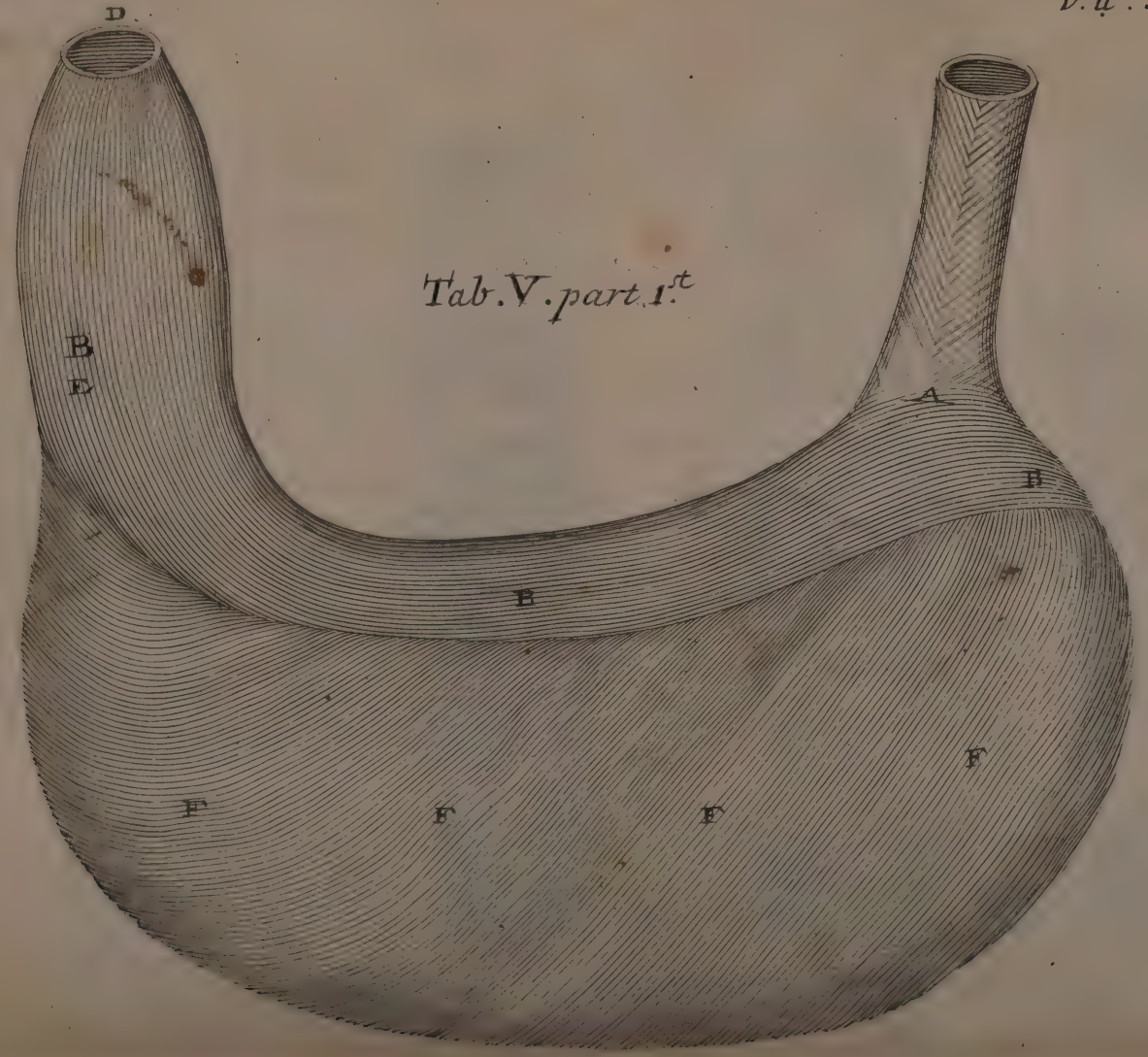

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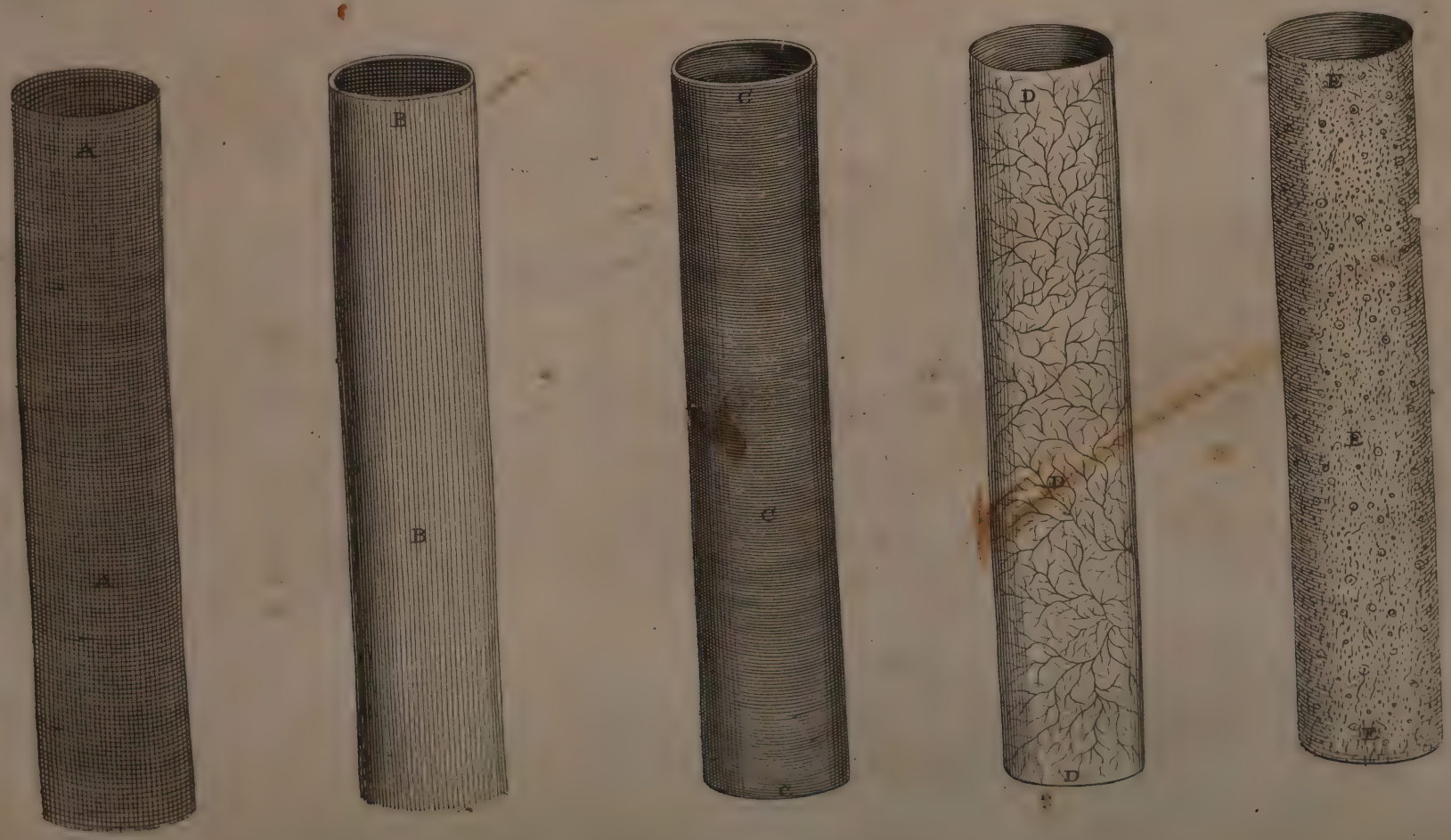
Tab. VI. part 1.st



The ſixth Table repreſents all the Coats of the ſmall Guts ſeparated from each other, ſo that the nervous fibres, with the glandules and branches of Veſſels, as alſo the ranks of moving fibres may clearly and diſtinctly be obſerved. *Phar. Rat.* Part. I.

A A *Shews the outmoſt ſurface of the whole Gut, whoſe nervous coat appears to be very thin, with its nervous fibres, which are extraordinary ſmall and round.*

B B *The outward ſurface of the middlemoſt or fleſhy Coat, which, when the other is taken off, appears very plainly with its row, or rank of moving fibres, that run lengthwiſe.*

C C C *The circular or annular fibres of the ſame Coat, which, when the former row or rank is taken off, moſt plainly appear.*

D D D *The inner, nervous Coat, whoſe inner ſurface, when the hairy veil is taken away, comes into view, with thick and numerous branches of Veſſels.*

E E E *The outward or convex ſurface of the hairy or glandulous Coat, which ſticks to the nervous Coat, and is full of glandules and little mouths of Veſſels.*

SECT. II.

CHAP. I.

Of Vomiting and Medicins that give Vomits.

HAving thus marked out, as it were, the Place of Medicinal action, or at leaſt lightly ſhadowed forth the firſt Scene thereof, my next buſineſs is to give you an account of the ſeveral kinds of Medicinal Operations, together with the Reaſons of them, and the manner how they work upon, or affect the parts. Firſt therefore let us inquire, what is done in the firſt ſtage, to wit, in the Stomach, and how Vomits work there. Where in the firſt place it will be neceſſary to explain what Vomiting is, as likewiſe from what cauſes, and upon what occaſion, whether naturally or preternaturally, it uſually happens. And then in the ſecond place, I ſhall ſhew upon what Parts, Spirits, or Humours, and how Medicins operate whileſt they provoke us to vomit.

How the Stomach and Weazon are affected in vomiting.

As to the firſt, if at any time any perſon be ſet on vomiting, he feels within himſelf the bottom of his Stomach drawn upward, and the upper orifice opened (whileſt the *Pylorus* in the mean time is very probably ſhut, or drawn inward) and that the whole paſſage of the Weazon at the ſame time ſtrains to make a ſpiral winding kind of motion upward, to the end that what is within, being by degrees puſhed higher, may at length be diſcharged through the mouth. Which motion of thoſe parts is queſtionleſs performed by the fleſhy fibres that compoſe the middlemoſt coat of the Stomach. For I have obſerved, that there are in this two diſtinct ranks of fleſhy or moving fibres, which encompaſs the Stomach in all its dimenſions; and being contracted at the ſame time, gather up the bottom and the ſides thereof, draw it upward, and bend it toward this or that orifice, that what is contained in it may be caſt forth through one or the other door. As for the inner fibres, that determine the contractions of all the reſt to this or that evacuation, if, through a ſmall irritation made any where about the bottom or ſides of the Stomach, the motion begins near the Pylorus, and the inward moving fibres are firſt and more ſtrongly contracted at their right ends, then the whole frame of the Stomach being drawn that way, pours out its load into the Guts; but if the irritation being vehement and very provoking, be cauſed in any part of the Stomach, and cannot eaſily be allayed or transferred toward the Guts, the motion beginning near the left ends of the inner fibres, and drawing towards the mouth of the Stomach, makes all the body of the Stomach, which is extremely ſtreightned and contracted, lean that way: in ſo much that the Pylorus being drawn inward, or ſhut up, and the mouth of the Stomach open, all things therein contained are thrown out, by way of Vomit. Now the ſame fleſhy fibres (according as the animal Spirits being variouſly provoked, do firſt guſh out of the ſeveral tendons into their right or left ends, and there begin the motion) are reſpectively determined to purging or vomiting. Moreover, when the Stomach is diſpoſed to throw a thing upward in manner

What fibres perform the buſineſs of Vomiting.

Phar. Rat. Part. I.

ner aforesaid, the Weazon too conspires in the action, and strives to get it out. For seeing we have observed that there are two double ranks of motive fibres in the fleshy coat of it, whereof the one part ascending obliquely, and the other descending after the same manner, cross one another, it seems to be the office of the former, being orderly contracted whilest the Party strains to vomit, still to shut the Weazon behind the matter that is to be thrown out, and so by degrees to push it into the cavity of the mouth.

Vomiting a Convulsion.

Vomiting therefore, being a violent, and oftentimes an involuntary motion of the Stomach, may very well be called a kind of Convulsion: which I also affirm to proceed from the explosion [discharge] or a great expansion [or broadning] of the animal Spirits that possess or inhabit those fibres, according to our account of Spasms or Contractions and Convulsions elsewhere laid down. For those Spirits being extremely irritated or disturbed, and upon that account growing presently very vehement and springy, they rush impetuously out of the tendons that lie near the left orifice, and afterward immediately out of others into the fleshy fibres, which they extraordinarily blow up and shorten, in so much that all the parts of that coat are brought nearer to each other, the whole cavity of the Stomach being streightned, folded together, and consequently contracted toward the left orifice, drives all that is in it upward, in order to its being discharged by Vomit.

How Vomiting differs from other Spasms.

In most other kinds of Spasms the convulsive motion is wont to proceed the same way as the natural: But Vomiting seems to be quite contrary, or at least opposite to the ordinary and natural action of the Stomach. For the usual and almost constant gesture or motion of that, is to be contracted either wholly or in some parts, downward or toward the Pylorus: for such a motion or tendency it wants, not onely to swallow meats, but that they may descend into the bottom of the Stomach, and there being more streightly compressed, be rolled from side to side, digested into Chyle, and after that transmitted to the Guts. Wherefore for these uses the moving fibres of both ranks, being blown up by the kind incursions of the Spirits, put the Stomach into such a posture as the instinct of Nature requires and suggests.

Again, If any irritation happen in the nervous fibres of the Stomach as long as the offence is slight and easily removed, the expulsive contraction works toward the Pylorus rather than the Weazon; but in Vomiting, the contraction of the motive fibres beginning from their other, that is, their left ends, and growing immediately more violent and impetuous, forces the whole cavity of the Stomach, being gathered up together, and much streightned, to bend toward the left orifice, and empty it self that way. The reason of which is, because if there be any thing in the Stomach that is very disagreeable and repugnant to Nature, it ought not to be carried the ordinary way through the long circuit of the Guts, and so at last be voided at the Fundament, but to be rejected by a nearer passage, and immediately be thrown out, lest by remaining there it should cause in the Body some incurable disaster. Besides, when any great mischief befals other parts remote from the Stomach, it oftentimes so happens, that People Vomit by consent [of the parts] for the greater security of the Stomach, lest whilest Nature is imployed about those other parts, the Stomach (in which is the original nourishment and fewel of life) should receive any thing that is hurtful. So well it is contrived by the providence of the Divine Creator, that for the greater security of Mans Body as of some Castle, as often as a foreign Enemy comes upon it, or that its own Natives raise Civil Wars, immediately all Strangers are turned out of the very Avenews, to wit the Stomach, as Persons suspected.

The immediate cause of Vomiting.

Now therefore the principal and immediate cause of Vomiting is, the sudden and vehement explosion or discharge of the Animal Spirits that are in the fleshy coat of the Stomach; by which they being very much irritated or stirred, and consequently expanded [or widened] and rarified, and gushing impetuously out of all the tendinous fibres, but first and chiefly out of them, that are planted near the mouth of the Stomach into the fleshy ones, do so on a sudden inflate or blow up and shorten them, that the sides and bottom of the Stomach being drawn nearer to each other, and at the same time raised toward the left orifice, throw out what is therein contained into the passage of the Weazon, through which (since that is likewise presently contracted all along from the bottom to the top) they are carried off at the Mouth.

How the Spirits are moved in Vomiting.

These Spirits are so exploded or discharged in Vomiting, because they are extremely irritated or provoked: which how it comes to pass, I have shewn in my Treatise of Convulsions: to wit, that they, being of a very elastical or springy nature, when any thing disturbs them, yea sometimes of their own accord, and by reason that what should be their couple to keep them together is of a different nature, break forth, and hurry themselves impetuously toward all parts. But upon what account, and how it happens

pens that they are ſo provoked, we ſhall enquire by and by. In the mean time we may obſerve, that the Spirits which reſide in the fibres of the Stomach are in ſome people either thicker or ſtronger, ſo that they are not moved to ſuch emetick exploſions or diſcharges by Vomit, unleſs the irritation or provocation be very great and ſtrong: but in others they are more ſubtle, *i. e.* ſlender, or elaſtical and ſpringy, ſo as to be eaſily incited to vomitive Spaſms or Contractions. So alſo we may take notice, that when the provocation is given to the fleſhy fibres of the Stomach, the contraction that is cauſed in them, tends more readily toward the Pylorus, but in others, toward the mouth of the Stomach; and conſequently it is accordingly attended with Vomiting or Purging.

The more remote cauſes of Vomiting.

Wherefore, as to the more remote cauſes of Vomiting, I am of opinion, that they are all ſuch things as do extraordinarily irritate or provoke the Spirits, which are in the fleſhy fibres of the Stomach: which being performed after ſeveral manners, I ſhall reduce them to ſome certain Heads. And firſt, All unproportionate objects that affect the other inner and nervous coat of the Stomach, or rather the Spirits that reſide in it, are to be looked upon as conducing thereunto; for that coat being vellicated, or twitched by them, doth oftentimes move the other which lies over it to vomitive contractions. Now thoſe provocatives are either taken in at the mouth, that is, they are either diſagreeable Food, Medicins, Poiſons, or other matter generated in the Stomach; or laſtly, are brought thither from remote parts by the Arteries and Nerves: or elſe ſecondly, the Spirits that reſide in the fleſhy fibres of the Stomach are irritated or ſtirred up by ſome diſtubance given to other Spirits that are here and there diſperſed at a diſtance, and do communicate their grievance to the Stomach by the paſſages of the Fibres or Nerves. Vomiting which is excited by the former of theſe two cauſes, is ſaid to be a proper indiſpoſition of the Stomach, but this latter happens by conſent. Of all which I will give you ſome inſtances.

The chief cauſe of Vomiting. An Organ of Senſe in the Stomach.

Firſt therefore an irritation or provocation in the inner coat of the Stomach, cauſes Vomiting ſooner than any thing elſe: For this part being nervous and very ſenſible, receives impreſſions from all thoſe things that are contained in the Stomach; and accordingly, as thoſe are pleaſant or unpleaſant, the fleſhy coat that is above it, is excited to keep in, or throw out what is within; and as to theſe two laſt motions [of reteining or expelling] we either Purge or Vomit, according as the unproportionate object is more or leſs injurious to Nature. Moreover, in this coat of the Stomach there ſeems to be a kind of peculiar Senſory, or Organ of perception, either of Touching or Taſting, diſtinct from any other in the whole Body: For though ſome ſorts of Medicins or Food, as *Stibium*, *Mercurius vitæ*, *Flower of Antimony*, and *Barbels eggs*, with many other things, when they are chewed in our mouths, do not offend the Senſe at all, yet the ſame things when ſwallowed down into the Stomach, do violently irritate or provoke this coat, and in a ſhort time cauſe very grievous contractions, or convulſions. So if any one even unawares ſwallows down a bit of meat that he hath an Antipathy againſt, though it be never ſo ſmall, and covered with other meats, as it were with a Viſor, yet the Stomach knows it, and turns it preſently out, like an Enemy that had got in by ſtealth. The Provocatives to Vomiting that are taken in at the mouth, are either Medicins whoſe manner of working ſhall be demonſtrated by and by; or they are Poiſons, which produce that effect, in as much as they upon their firſt contact or touch, being of a very deſtructive Nature, aſtound the Spirits of the Stomach, and make them as it were mad. Or Thirdly Food, concerning which it is commonly known, that if they offend us either in their manifeſt or hidden quality, or in their quantity, or manner of being taken, they become unproportionate to the Stomach, and conſequently very often cauſe Vomiting.

The Provocatives to Vomit, are either taken in at the mouth;

Or generated in the Stomach,

Secondly; The matter that cauſes Vomiting is ſometimes generated in the Stomach, that is, though there be no fault in the Food, when taken in, yet ſometimes the chyle, or the fermenting juice of the Stomach, degenerates into an acid, ſower, or bitter humour, or ſuch as is otherwiſe irkſom, and conſequently provoking; as it very uſually happens in cholerick and hypocondriacal perſons.

Or is ſent from ſome other part;

Thirdly, Nor is the provoking Humor leſs frequently ſent into the Stomach from ſome other part: for beſides that the Gall, and (as ſome think) the Pancreatick or Sweet-bread juice ſometimes ſeverally, ſometimes together (whilſt they mutually boyl and are diſcharged into the Stomach) excite the fibres to vomitive contractions; and that likewiſe other heterogeneous matter, which is brought hither by the Arteries, cauſes oftentimes extraordinary Vomitings: ſo in the fits and criſis of Fevers, but eſpecially in the Plague and Small Pox it very often happens. Sometimes the maſs of Bloud when it ſwells ſo that it cannot expel or throw off its groſſer part by perſpiration, it carries it into the cavities or hollows of the Stomach and Guts by the branches of the *Arteria Cœliaca*; ſo

Phar. Rat. Part I.

The Vomitive matter comes through the Nerves too.

that the coats of those parts being mightily vellicated or twinged, undergo horrid Vomitings, and even Dysenteries too at the same time. Nor doth the Vomitive matter seem to descend onely through the Arteries, but some times through the Nerves too. And from hence I have plainly shewn the Colick very often to arise: Yea in many People (that have been subject to Convulsions) I have observed, that after an Headach, with drowzines and swimming in the Brain, they have been disposed to vomit: in so much that every day they would throw up all they had eaten without any signal uncleanness in their Stomachs. Now the matter being thus brought in by the Arteries or Nerves upon the coat of the Stomach, if it be fluid and easily dispersed, is presently shook off again, and the Fit is soon over; but if it be more fixed, and sticks to them more stifly, or (as it some times will) grows into Tumours or Risings of several kinds, it causes a disposition to Vomit, which stays long by one, and is not easily cured.

Vomiting by sympathy or consent.

So much for that kind of Vomiting, whose material or provoking cause, being planted somewhere about the inward surface of the Stomach, and affecting the nervous fibres with meer touching of them, doth excite the Spirits which reside in the fleshy fibres, to violent explosions, or discharges, by way of Vomit. But there are other kinds of Vomitings, in which the first provocation is in other places, and the Stomach is immediately moved to contract it self by consent. For since there is such an alliance and mutual dependence between this Entrail and many other parts, it often happens, that when any animal Spirits are any where very much disturbed, immediately other Spirits that are inhabitants in the Stomach, are likewise moved, either by the continuity or connection of the fibres and nerves, and so are put upon vomitive explosions, or violent discharges by way of Vomit.

By consent of what parts.

The places of this sympathetical Vomiting, are either nearer; to wit, the two orifices of the Stomach, with the Duodenum and the Weazon; or more remote, to wit, the Brain and the membranes thereof, as also the Spleen, Reins, Ureters, Mesentery, Womb, and perhaps other Entrals in the lower Belly: in one or more of which, if a contractive motion be begun, and from thence communicated to the Stomach through the Nerves, it excites the fleshy fibres thereof to cause a Vomit. So likewise in the Head, when the animal Spirits are much disturbed, their disorder presently affects others that are in the Stomach, by consent, and raises them into the like tumults. I will lay down instances of every one of these sorts, together with their causes.

First from both orifices of the Stomach.

First of all both the orifices or doors of the Stomach, since they are very sensible by reason of those manifold insertions of Nerves, are easily provoked; and consequently, being drawn sometime inward, sometimes outward, and variously expanded [or widened] and shut, they cause expulsive motions, either upward or downward, in the whole Stomach. There is hardly any man but may feel in himself certain acid or bitter Humours floating in his Stomach, and that by biting the left orifice, they cause queazines, or vomiting; and so doth the Gall too, when it rejounces into the Pylorus.

From the Pylorus.

It would be too impertinent to tell you *Helmonts* Dreams concerning the dignity and dominion of these parts: where he makes the left orifice to be the Seat of the Soul: and the right, to wit, the Pylorus, that of the Appetite, as also the Shop or Workhouse from whence some other actions or passions purely natural have their original; and so likewise that from the indignation (as it were) and obstinate shutting up of this part, horrid vomitings proceed. Although I do not at all agree to what he says, yet the following Stories will shew you, that if these doors are too fast bolted or barred, it will occasion Vomiting, and other evil dispositions of the Stomach.

Instance in a particular case.

A young Gentleman that had been long out of order, was troubled first with frequent Vomiting, and afterward every day for several moneths, in so much that it was almost continually upon him, till at length being quite spent with it, he died. I therefore opened the Body and found the Pylorus encompassed round about with very tender and sensible small bumps or swellings, that did almost shut its mouth quite up; in so much that the Chyle which was got into the little distances between the nodes or knots, did putrifie extremely, and the whole Entral in a manner was in very great pain, and troubled with a continual Spasm or Convulsion.

Vomiting from the shutting of the left orifice of the Stomach. A notable case.

So likewise it is very plain from that extraordinary case of an *Oxford* Man, that the shutting up of the left orifice causes in a manner continual vomiting. There was a very strong person, and a man that was otherwise sound enough, who had for a long time been troubled with frequent vomiting, and used to bring up what he had eaten oftentimes, though not always, as soon as it was got into him: At last when all remedies had been tried and found of no use, the distemper came to such an heighth that he would eat very hungryly

gryly, till ſuch time as his Weazon was top full up to his throat, and then preſently throw all that he had ſwallowed up again crude and unconcocted as it went in, ſo that nothing at all went into his Stomach; now therefore ſince Medicins [Phyſick] did him no good, but that he was ready to faint for hunger, and in danger of dying every day, I got him an inſtrument, like a ſmall rod, made of Whalebone, with a Button or Knob of Spunge faſtened to the end of it: which inſtrument the diſtempered perſon putting into his throat and weazon immediately after he had eaten and drank, he opened the mouth of the Stomach and thruſt the meat (which otherwiſe would have ſtaid by the way) down into it; and thus did he ſuſtain himſelf for 16 years, uſing the ſame Engine to this day, and being ſtill alive and in health, though without that inſtrument he would certainly die for want of nouriſhment. Without queſtion in this caſe the mouth of the Stomach being always ſhut, either by a Tumour or a Palſie, admits nothing into it, unleſs it be violently opened. *Phar. Rat.* Part I.

2. As often alſo doth a Spaſm or Convulſion which is once begun, and by the continuity of the fibres promoted into the ſtomach, cauſe contractive motions to vomit, by reaſon of the provocatives that are hard by above this left orifice, and below the Pylorus. When the meat, as it goes down, ſticks in the Weazon by reaſon of a Palſie, or ſome obſtruction there, and conſequently ſtimulates or pricks the nervous fibres, immediately the fleſhy ones, being drawn upward, make the ſtomach alſo conſent in the motion. The like effect is often produced by the irritation or provoking of the palate or uvula. And hence it is that meat or drink which is ungrateful, even as ſoon as it is in our mouths, or a Fether put down the throat, cauſes vomiting, or very often ſtraining to vomit. For the ſame reaſon in a Pthiſick, a violent fit of coughing is accompanied, or attended with vomiting: to wit, through the vellication [or plucking] or concuſſion of the ſame coat, that covers both the Weazon and the top of the Wind-pipe too: So likewiſe in the lower appurtenances of the ſtomach, to wit, the Guts, if any pain and convulſion happens in thoſe parts, it often cauſes vomiting through the continuity of the fibres by which it creeps into the ſtomach. For this reaſon in the cholerick Diſtemper, the Iliack Paſſion, or Twiſting of the Guts, and other torments of the Bowels, people often vomit. And hence alſo ſome men that have Guts more tender than ordinary, do conſtantly vomit when they take a Clyſter. It were eaſie to heap together upon this occaſion many more inſtances of this kind, but let us paſs to other cauſes of vomiting. *The cauſe of ſympathical Vomiting.*

3. Beſides theſe that I have juſt now cited (in which the provocation begins either in the Stomach it ſelf or the appendages of it) it ſometimes happens that the Stomach, though it be in it ſelf ſound enough, and free from any fault, ſuffers for the miſdemeanours of other parts a great way diſtant from it; which is not brought to paſs by the continuity of the fibres, but by the intercourſe or commerce of the nerves. For through them, when the animal Spirits in one place are diſturbed, others that reſide afar off, conceive the like diſorder, and ſuffer convulſions: whence it is, that if a man receives any great wound or blow upon the Head, it often cauſes him to vomit, becauſe the Spirits within the Brain, being diſturbed, excite the others that inhabit the Stomach into the ſame commotion, by the commerce or intercourſe of the eighth pair of Nerves: for the ſame reaſon ſome that go in a Boat or a Coach are apt to vomit extremely; of which the cauſe is not (as ſome ſay) an agitation or joging of the humours, but indeed the animal Spirits which are in the Brain, being forced into irregular motions, do throng into the mouths of the nerves, and through them cauſe contractive motions to vomit. In the mean time the matter that is thrown off by vomiting, is meer choler, which is drawn forth from the Veſſels deſigned for the reception of it, by a ſpaſm or convulſion formerly cauſed in them; ſo far it is from being the primary or chief cauſe of vomiting. Moreover if at any time the ſprouts and lower branches that grow out of the trunk of that ſame eighth pair, and are diſtributed into peculiar Entrals of the Abdomen or lower Belly, are provoked to convulſions, other ſprouts very often, though untouched, undergo ſuch irregularities, and do alſo communicate convulſive motions to other Entrals, but eſpecially to the Stomach. This is evident from that vomiting, which frequently happens in Fits of the Stone in the Kidneys, the Colick and Fits of the Mother. *Vomiting cauſed by intercourſe of the Nerves.* *In the Head.* *In the lower Belly.*

Hitherto of Vomiting in general, together with its ſubject, nature, cauſes, and various productions; in which I have plainly ſhewn that this effect is produced altogether by the Spirits, which inhabiting the fleſhy coat of the Stomach, are extraordinarily provoked and forced into convulſive exploſions or diſcharges; but that thoſe Spirits are for the moſt part and chiefly moved to ſuch contractions by the painful impreſſion that is made upon the inner nervous coat. And yet farther, I have alſo ſhewn that thoſe Spirits which cauſe vomiting are diſturbed by the diſorders of other

Phar. Rat. Part I.

Spirits in ſome diſtant parts, which either by the continuity of the fibres, or the paſſages of the nerves communicate their troubles to the Stomach. Theſe things therefore being thus premiſed, it remains in the next place (what I propoſed to do in the ſecond place) that I treat of Vomiting Medicins, and demonſtrate how, and with what difference they work upon the Stomach and other parts of the Body.

How Vomits work.

For the performing of this, it is obvious to conceive, that Vomits taken in at the mouth and received into the Stomach, do firſt irritate or provoke its inner coat, which is altogether nervous, and put it to ſome pain; then that by the inſtigation of this nervous coat the fleſhy one that is over it, is alſo affected or moved and excited to contract it ſelf and throw out that troubleſome matter which is within. But in the doing of this, there are ſome differences both in the modes of irritation, and ways of evacuation, the reaſons of which do not eaſily appear.

For firſt, ſince purging Medicins, being ſwallowed into the Stomach, provoke the fleſhy fibres thereof to expulſive contractions, whence comes it that ſome of them ſhould more frequently and rather incline to vomiting, and the reſt onely to purging, and not indifferently to either?

Secondly, Among thoſe things that commonly, and almoſt conſtantly cauſe vomiting, you may obſerve, that ſome of them produce that effect by a way of working that is very manifeſt; as when that we take is altogether ungrateful to us in Taſte, Smell, or any other ſenſible quality; or that it offends in quantity; and likewiſe that there are other Medicins which are more properly and ſpecifically reckoned Vomits, whoſe Vomiting virtue or power, though altogether hidden from our ſenſes, ſhews it ſelf by effects which are produced in the Stomach. The ſolutions or rational accounts of all which do much contribute to the right underſtanding of Vomits, and the operation of them.

The reaſon why we vomit rather than diſcharge by Stool.

1. As to the firſt, All Medicins that you would have to work by Vomit rather than by Stool, ought to conſiſt of ſuch particles, as being irkſom, or at leaſt diſagreeable to Nature, may likewiſe be of ſuch a quality or quantity, that they cannot be either totally overpowered by the ſtomach, or ſo long endured by it, till they may be by degrees wiped off from the fibres or hairy veil thereof, and carried out of the Pylorus with other juices by little and little. Now if thoſe kind of particles do either vellicate or twinge the fibres of the ſtomach too violently, or ſtick to it too faſt, or diſturb and ſtretch it with their motion, immediately tke fleſhy fibres are ready for an expulſion, and then by inſtinct of Nature they are the rather contracted in ſuch a manner, as that they may throw off what is offenſive with the greater force and the neareſt way. How the fleſhy fibres are moved in the buſineſs of Purging, I ſhall hereafter tell you in its due place.

Vomits are either ſtronger or more gentle.

As to the diſtinction of Vomits, and the ſeveral ways or reaſons of their working, ſince they are commonly divided into two ſorts, to wit, ſuch as are more gentle, and thoſe that are more ſtrong; whereof the former carry their force, and power or virtue in view (as it were) declaring their irritative or provoking quality by manifeſt ſigns; as when a Decoction of Hyſſop or Carduus, an infuſion of the roots of Squills, or Radiſh, diſſolved Vitriol, warm Water or Water mingled with Honey (if you drink a great draught of it) and the like (which upon the firſt ſight or taſte move the ſtomach) are given for Vomits: and when they are given, it oftentimes is neceſſary for them to be aided by the irritation of the palate and throat in order to their producing of a Vomit. Secondly, The ſtronger Vomits (which are more properly ſo called) are ſuch Medicins, that if they are taken in a due quantity they move moſt People to Vomit; as for example, *White Hellebore*, *Nux Vomica*, *Vitriol*, with many Preparations of them and Mercury: which though they are uſeful, yea very neceſſary in Phyſick, yet in their nature and virtues, wherein their vomiting quality conſiſts, they ſeem to differ very little from poiſon: wherefore if they are taken in a doſe too great, they often are the death of the Patient. Now ſince it remains as the ſubject of our next enquiry to ſearch how, and by what means theſe Medicins work upon the ſtomach and other parts of the Body, I ſhall in the firſt place lay down all the *Phænomena* or appearances which are worthy our obſervation in this kind of Medicins.

Stong Vomits are next to Poiſons.

How they operate in the Stomach.

Vomits made of *Stibium*, and other ſtronger ones ſwallowed down into the ſtomach, do not uſe preſently (unleſs in thoſe that have queazy ſtomachs before hand) to irritate or diſturb it; but afterward, ſometimes ſooner and ſometimes later, the Patients feel a kind of maukiſhneſs and diſorder; then the ſtomach is contracted and aſcends, its orifice opens, and the Weazon moves briskly upward toward the Throat, being attended immediately with vomiting; which when it is over, thoſe Entrals ſink down (as it were) and are a little at reſt: yet in a ſhort time after, the maukiſhneſs and diſorder of the ſtomach, together with the aſcent of that and the Throat return,

and

and are accompanied with Vomiting; and ſo now and then the ſtraining and ceaſing to vomit alternately ſucceed each other for ſeveral times together, till the force of the Medicins being quite ſpent, this operation ceaſes.

How they affect it.

In the beginning of a Vomit, the ſtomach ſeems onely to be contracted upward, and not extraordinarily provoked. But after the convulſions of it are more ſtrong and vehement, and diffuſe themſelves to a greater diſtance, in ſo much that the Duodenum, by an inveſted kind of contrary motion, directs all its contractions upward, and poureth all that is within it into the ſtomach, which makes the motion to vomit ſo much the ſtronger. Now if the irritation or provocation be ſtill more augmented, not onely Spaſms [*i.e.* contractions] diſtenſions and ſwellings, and eſpecially that more dangerous convulſion of the ſtomach, to wit, the Hickock ſucceed thereunto: but alſo for that the animal Spirits are diſturbed throughout, and ſometimes ſcattered or excited too much, there happen frequent Faintings, cold Sweats, and many times deadly convulſions of the Limbs or the whole Body.

what and of how many ſorts the matter is, thrown off by Vomits.

After the taking of a ſtrong Vomit, when the ſtomach begins to vomit, firſt that is thrown out that floats in the cavity thereof; then whatſoever viſcous or clammy flegm, that ſticks to the hairs, or is laid up in the folds of it: if the vellication or twinging continues, there are ſerous humours ſqueezed out at the mouths of the ſmall Arteries and Nerves; then when the contraction is communicated to the Duodenum and the paſſages of it, the Gall and Pancreatick juice, being forced out of their channels and poured into the ſtomach, are there diſcharged: from whence it comes to paſs, that cholerick humours are oftentimes laſt caſt forth, and then very frequently men vomit meer Gall, and that in great plenty: which if it ſo happen, every time any thing is thrown out, there is a griping a little below the ſtomach on the right ſide, that creeps upward; which, no doubt, proceeds from the Gall that is expelled into the Duodenum, and from thence through the convulſive and inveſted motion of that Gut, poured into the Pylorus. If the irritation doth not yet ceaſe, the Arteries (whoſe mouths are exceedingly provoked) ſend out humours from the whole maſs of Bloud to be evacuated by vomiting.

How Vomits work.

From this account of Vomiting, you may gueſs how and which way a vomitive Medicin works in the Stomach, to wit, when it is ſwallowed into the ſtomach, and hath mingled it ſelf with the humour therein contained, impreſſing a tincture of it ſelf is gradually received by the hairy veil which covers the inward ſurface of the ſtomach, and then the nervous fibres that make up the inner coat, and ſuſtain or uphold this veil, do by degrees imbibe or drink in that virulent tincture; wherewith when they are in ſome meaſure ſated, by reaſon of the diſagreeableneſs of its juice, they begin to be wrinkled and much diſturbed: whereupon the fleſhy fibres that lie over them, being provoked by that pain which the nervous ones ſuffer, ſuffer at firſt ſome light convulſions in ſeveral parts here and there (from whence proceeds naukiſhneſs and diſorder of the ſtomach) but ſoon after the ſpirits that reſide in all of them which belong to the two inward ranks are exceſſively diſquieted, and being at the ſame time exploded or diſcharged (as it were) cauſe very ſtrong contractive motions to vomit, to the end that they may throw off by Vomit all that is troubleſom to the nervous fibres: And when by this means thoſe fibres are freed from that Medicinal juice which they had drank in, the inclination to vomit ceaſes for ſome ſmall time, till the fibres being again moiſtened with a freſh ſupply of the ſame virulent tincture, which they quickly ſuck out of the hairy veil, are urged and forced to the ſame trouble and put upon a motion to vomit. And ſo for ſome ſeveral times the violent inclination to vomit comes upon a man, till ſuch time as the matter of that venomous tincture be wiped clean away even from the hairy veil, and all at length thrown out, ſo as that the nervous fibres of the inner coat may never after imbibe or drink in the poiſon of it.

Why there are intervals in Vomiting.

Vomiting not eaſily ſtopped.

But it doth not therefore happen always that people ceaſe to vomit, but though the Medicin be quite and clean thrown off, and no contagion of it left behind, yet oftentimes thoſe Spirits in the ſtomach, being much provoked, do very difficultly lay aſide their fury; in ſo much that may be irritated by any other juice (which the nervous fibres have imbibed) and moved to vomitive contractions, which they now and then do ſeveral times repeat: wherefore at that time if you would have your vomiting ceaſe, take no drink either for food, or as a cordial into your ſtomach, but onely keep your ſelf warm without, and go to ſleep.

Humours ſqueezed into the Stomach increaſe the operation.

Moreover, Sometimes other Humours preſſed out of the veſſels, and eſpecially the Gall, poured forth from the veſſel that is prepared for the receiving of it, into the ſtomach, do not onely add ſtrength to the vomit; but when its operation is over, perſiſt or continue to provoke the ſtomach ſtill on, and move it to expulſive contractions:

yea

yea, the nervous fibres thereof imbibing that yellow, nauſeous humour, which is as provocative as the vomitive tincture it ſelf, cauſe convulſions, and beyond the force of the Medicin, prolong the frequent inclinations to vomit in order to exclude that troubleſom matter. For this reaſon, when the Gall overflows, ſeeing it is eaſily brought into the ſtomach, oftentimes exceſſive vomiting is cauſed by a gentler kind of Medicin, and is attended by horrid ſymptoms: for the allaying whereof, ſometimes it is proper to give a Lenitive, or eaſie Clyſter, to draw the ſwelling Gall toward the lower parts.

Why Vomits work ſooner in ſome People.

But whereas ſometimes when a man takes a Vomit, the effect follows ſo immediately, that is to ſay, when a Medicin reaches the bottom of the ſtomach, but doth not enter deep into the fibres of it; the reaſon is, either becauſe the hairy veil being partly wiped off (as in Gluttons and Drunkards it uſually happens) the nervous fibres being made bare, are ſoon and eaſily provoked; or, becauſe the Fanſie loathing Phyſick, had made the Party qualmiſh before-hand: Or laſtly, becauſe the ſtomach being oppreſſed with a putrid conflux of excrementitious matter, was formerly of it ſelf diſpoſed to vomit. As to the nervous fibres, which by drinking in the vomitive tincture, have a ſenſe of that diſturbance, whereby the fleſhy fibres are irritated or provoked into convulſive motions, they are the very ſame, that being very empty cauſe hunger; and being very dry, thirſt; ſo likewiſe when they are filled with a grateful kind of juice which comes out of the food, they beget a complacence in the ſtomach, and refreſh the whole Body beſides.

How Vomits in a ſolid form work.

Since Vomits uſe to be adminiſtred either in a liquid or a ſolid form, it will be eaſie to underſtand how the former enter into the nervous fibres of the ſtomach, and fill them ſo as to provoke or irritate them; but of the latter ſome Phyſicians do juſtly doubt, how a little Duſt or Powder, as of *Stibium*, or *Flower of Antimony*, given in the weight of three or four grains, ſhould make ſuch a ſtrong Vomit, ſeeing that it looks very improbable that thoſe fibres ſhould in any meaſure be impregnated (at leaſt not enough to cauſe a Vomit) by ſo ſmall a Medicin, which would not eaſily get into them. To this we muſt anſwer, that ſuch a Medicin given in a dry ſubſtance, is preſently diſſolved and imparts its virtue to moiſture enough in the ſtomach; in ſo much that if you make an Infuſion of *Crocus Metallorum*, the fibres of the ſtomach drink in the diſſolved particles of Antimonial Sulphur, and are thereby provoked to vomitive contractions or convulſions.

Vomits do not work alike in all Doſes.

As to what ſome affirm, to wit, That a Vomit, be it given in a Doſe never ſo great, works no ſtronger than if it were taken in a ſmall quantity, is altogether falſe, and a thing not to be experimented without a great deal of danger; for if there be ſeveral ſmall parts of the Medicin at hand, they will impregnate a proportionate number of fibres, and enter deep into them, ſo as to provoke them very much: and conſequently very great and frequent convulſions muſt of neceſſity follow.

Vomits do not work by a ſpecifick virtue.

As to the vulgar Opinion, That Vomits raiſe and expel the Humours upwards by a certain ſpecifick propriety, I think it very frivolous; for what kind of virtue that is, no man can tell, or ſo much as prove that there is ſuch a thing in nature. In the mean while it is enough, for the underſtanding the reaſon of Vomits, to conceive, that the ſmall parts of the Medicin, being very repugnant to Nature, are imbibed or drunk in by the nervous fibres of the inner coat of the ſtomach, and create a great commotion in them; and then, for the expelling of that juice quickly, and a nearer way upward, that the fleſhy fibres of the other coat are irritated and provoked into emetick or vomiting convulſions. But what is urged by ſome, to wit, that white Hellebore applied to the Navel, and the Infuſion of *Crocus Metallorum* given in the form of a Clyſter, is a Vomit, I have found by frequent Experiments to be utterly untrue: Though if ſometimes it ſo happens, why may not a violent irritation or diſturbance made in the Guts, cauſe convulſions and inverted contractions, and ſo ſecondarily and by conſent of the parts, produce vomitings in the ſtomach? (as well as when the ſame thing very often falls out in the Colick and Iliack paſſion or twiſting of the Guts.) I formerly cauſed Wine, that was impregnated with the Infuſion of *Stibium* to be injected into the jugular vein of a ſtrong Dog, to the quantity of ſix ounces, and after five or ſix minutes he began to ſtagger, and totter as he went, and then to vomit exceſſively. Yet I believe that this effect was wrought by the Medicins working upon the Brain rather than the Stomach; ſince the like vomiting enſueth from anointing or bathing the head with the juice or decoction of Tobacco.

Vomits do not work upon peculiar Humours.

Nor do I think but that their opinion, who ſay ſome Vomits work upon the Gall, others upon the Phlegm, and others upon Melancholick matter, (bringing forth this or that Humour diſtinct from all others, and as it were, pure) is far from truth, and ſtands upon a very trifling foundation. But in the choice of Vomits, the chief difference

rence, to be obſerved, is, that in ſome caſes you muſt give the milder Medicins, which may make no diſturbance farther than the ſtomach, but may gently bring forth thoſe things onely that float in the hollow of it, or ſtick to the coats thereof: though in other caſes, the ſtronger are more convenient, that by creating a convulſion in the other Entrals too, all Excrements that lie in them, or are any where gathered together, may be removed from their ſtation, and thrown out either upward or downward. But whereas ſometimes a ſlimy, and as it were, phlegmatick matter is chiefly expelled, the reaſon is, becauſe the load of the ſtomach is almoſt onely purged away, without ſtirring of the receptacles of the cholerick humours; yet when thoſe veſſels which received the choler are drained, the Excrement is, for the moſt part cholerick: The expulſion of a black humour depends moſt commonly upon the tincture of the Medicin; for Compoſitions of Vitriol dye the excrement black. *Phar. Rat* Part I.

If Vomits are convenient, they are better than any other Phyſick.

As evacuation by Vomit is more violent than by Stool, ſo if it be conſiſtent with the ſtrength of the Patient, it doth more good in ſome caſes than ten Purges: for by this means the ponderous phlegm that ſticks in the folds of the ſtomach, and which all other cleanſers would ſlip by, is cleared away as with a Beſom; and ſo likewiſe the adjacent parts, as the Pancreas or Sweetbread, the Meſentery, the Spleen and Liver it ſelf are violently concuſſed or ſhockt, in ſo much that all obſtructions in them, together with all ſtagnations or ſetlings of the Bloud and Humours whatſoever are very eaſily removed by this kind of Medicin. All ſtrange Ferments, wherever generated in the Body, and alſo the deeper ſeminaries of diſeaſes, are ſeldom rooted out without adminiſtring of Vomits; but eſpecially in the diſtempers of the Brain and Nerves the uſe of Vomits is found to be very advantagious. For by this kind of Phyſick not onely the filth of the Stomach and Bowels, which vitiates the Chyle and Bloud, is more plentifully cleared away; but alſo the glandules, which are the emunctories or Dreins of the Bloud and nervous juice, and ſeated in the Bowels, are cleanſed; the choler veſſels and other receptacles of Excrements more copiouſly evacuated, ſo that they being emptied by this means, do more readily receive the *Serum* or Whey of the Bloud, with other rejected or ſuperfluous parts of both Humours, which otherwiſe would ſettle in the head: and beſides all this, ſeeing there are an innumerable company of Arteries mouths that open under the hairy veil into the ſtomach; theſe when they are vellicated or twinged to any purpoſe by a Vomit, pour forth all the ill, malignant humors that are in the bloud, in order to their being thrown out there by way of Vomit. And for this reaſon chiefly it is, that great Diſtempers are beſt cured by Vomits, and ſcarcely without them. For thoſe Medicins being of a ſtrong and active nature, do not onely expel the ſuperfluous humours out of the Maſs of Bloud by twinging the Arteries, but by getting into the paſſages of the veins, which are there without number, they make the Bloud float, and cauſe the ſerous part of it, with other leſs noble Humours to ſink and ſeparate themſelves. But in the mean time Vomiting Phyſick is not to be uſed by all People without any diſtinction. For in ſome the tone of the ſtomach is too looſe and weak, and their conſtitution ſo tender, that their Spirits preſently faint with vomiting, and their ſtrength is enfeebled; ſome alſo have their Bowels endued with extraordinary retention of ſuch ſenſible impreſſions as are made upon them; and though they are long before they can be made to vomit, yet their vomiting, when once begun, is not eaſily ſtopped; yea, through their frequent ſtraining to vomit, they are expoſed to great loſs of ſtrength and oftentimes ſwoonings too.

It is to be uſed with caution.

Wherefore, rightly to adminiſter a Vomit, we muſt conſider what ſhews when it is proper, what permits it, and what forbids it. Now Vomits ſeem to be proper, when the cholerick and bitteriſh Humour floats in the ſtomach, ſo as to cauſe a qualmiſhneſs, ill taſte, or headach; ſo likewiſe if the ſtomach be oppreſſed with clammy Phlegm, as in the Green Sickneſs, and in men after hard drinking and gormandizing. In many caſes, where beſides ſhortneſs of Breath, the ſtomach being clogged, is troubled with want of Appetite or naukiſhneſs, Vomiting is uſeful. Moreover when the ſtomach is beſet with any ſtrange ferment, ſo as to reject all that comes into it, even for the ſake of remote parts, Vomiting oftentimes is uſed with good ſucceſs: for by this means the choler veſſels are mightily emptied, and ſo the Choler being the more plentifully purged out of the Bloud, the feveriſh indiſpoſitions thereof are removed. And then again, in reſpect that the ſuperfluities or ſtagnations of the nervous Humour are moſt eaſily cured by ſuch evacuations as theſe, the uſe of Vomits contributes very much toward a cure in the Gout, Aſthma, Epilepſie, Madneſs, and many other diſtempers that are accounted great and herculean Diſeaſes. 2. This remedy may be permitted to be uſed, if the Bowels are ſtrong, and the Conſtitution of the Body firm, and eſpecially in ſuch perſons as having ſhorter necks and breſts than ordinary, have their ſtomach and mouth nearer one another; and to this alſo doth relate facility, or eaſineſs

The Indication of Vomiting.

Things that permit it.

to

Phar. Rat. Part. I.

to vomit, looſineſs of the matter which is to be purged out with a ready faculty of ſeparating of it, as alſo a ſedateneſs of Nature, and as it were, leiſure to apply her ſelf to this work. 3. Thoſe things that forbid Vomiting, are difficulty to vomit, or an indiſpoſedneſs to it found by former experience, a tender and ſoft conſtitution of body, a ſlim tall ſtature, and weak Bowels, but eſpecially if a man be inclined to a Conſumption, with an ulcer in the Lungs, or ſpitting of Bloud: ſo likewiſe a great and general indiſpoſition, in which it is dangerous, leſt the Humours ſhould be preſſed tumultuouſly out of the whole Body into the Stomach: ſo alſo an unuſual boyling up of the Bloud, fits of Fevers, and expectation of a Criſis [or time when to make a judgment of the Diſtemper] do totally exclude this kind of Phyſick.

Things that prohibit it.

The Medicins called Vomits, are uſually diſtinguiſhed according to their operations, into gentle ones, middling ones, and ſtrong ones. As to the matter of which they are made, that is ſome parts of Minerals, Vegetables, or Animals; and they are either ungrateful to the taſte and palat, as *Vitriol, Tobacco, Briony-root, &c.* or they taſte well enough, as the *Mezerean Fruit*, the *Nux Indica*, the *Eggs of a Fiſh called a Mullet or Barbel*; or laſtly, they are almoſt inſipid, and without any taſte at all, as *Flower of Antimony, Crocus Metallorum, Mercurius Vitæ, &c.*

CHAP. II.

Receipts for Vomits, together with a rational account of ſome of them, as to their Preparations and Chymical Reſolutions.

TAke of Oxymel of Squils ℥i. ß. *of Wine of Squils* ℥ ij. *mingle them, and make a Vomit.*

Take of the Leaves of Aſarum or Wild Spikenard freſh gathered from 6 to 9, and when you have bruiſed them, pour to them ℥ iij. *of White Wine; then ſtrain it and take it according to order.*

Take of the Powder of the Root of Wild Spikenard ℥ j. *to* ℈ iiij. *of Oxymel of Squils* ℥ j. ß. *mingle them and take it in a draught of Poſſet-drink.*

Take of the Salt of Vitriol ℈ j. *to* ℈ ij. *or* ℥ j. *and drink it in a draught of Poſſet-drink.*

Take of the Infuſion of Crocus Metallorum ℥ ß. *to* ℥j. *or* ℥ j. ß. *and drink it in a draught of Poſſet-drink, according to order.*

Take of the Infuſion of Crocus Metallorum ʒ vj. *of Wine of Squils* ℥ j. ß. *of the Syrup of plain Sorrel* ℥ß. *mingle them and make a Vomit.*

Take of the Sulphur of Antimony gr. vj. *to* viij. *of cream of Tartar* ℈ j. *mingle them and let it be given in the pulp of an Apple, or a Stewed Prune, or in a Spoonful of Panade.*

Take of Mercurius Vitæ gr. iij. to vj. *and take it the ſame way. Take alſo Flowers of Antimony, Aurum Vitæ, or Præcipitatum Solare, and mineral Turbith, after the ſame manner.*

Thoſe Chymical Vomits that are of chief note, are uſually made firſt out of Vitriol, ſecondly out of Antimony, and thirdly out of Mercury.

Salt of Vitriol.

Vitriol Vomits.

Salt of Vitriol is preſcribed ſeveral ways, to wit, out of Colcothar prepared in a Lie, out of Blew Vitriol, calcined (according to *Angelus Sala*) and out of white Vitriol purified by frequent ſolutions and coagulations; which Medicin is commonly called *Theophraſtus*'s Gilla, and is the ſafeſt of all others, as well as eaſieſt to be had; but yet the two former Medicins are extraordinarily ſtyptick or aſtringent, and for as much as they have endured the fire, ſomewhat corroding; but the latter being gentle and kind enough, doth amicably pluck together the fibres of the Stomach and makes them ſomewhat wrinkled; in ſo much that they at laſt (to excuſs or ſhake off what is troubleſom to them) betake themſelves to contractions, and ſtrain to vomit: but that is ſoon over, and the diſturbance of the Stomach is preſently appeaſed.

Theophraſtus *his Gilla.*

The uſe of it.

Salt of Vitriol is therefore of more eſteem and value, becauſe it ſeldom works beyond the Stomach, nor doth it as Stibiates do, cauſe Convulſions in the Bowels, diſorders in the Bloud, or fainting of the Spirits; yet it is ſaid to have this fault, that it operates ſlowly, and ſometimes hardly at all; and therefore after any one hath taken Vitriol,

Vitriol, and drank a deal of Poſſet-drink, they are often fain to provoke themſelves to vomit, by thruſting a Fether down their throat, or drinking Carduus Poſſet, or Oxymel of Squils. *Phar. Rat.* Part I.

Antimonial Vomits. Crude Antimony no Vomit.

2. Crude Antimony, whileſt the mixture is entire, works neither by Vomit nor by Stool; of which the reaſon is, becauſe the Sulphureous and ſaline particles, from which the Vomiting quality proceeds, being bound up in it, and ſtifled, as it were, by the reſt, cannot exert their force; but when this mixture is diſſolved by preparation, and ſomewhat looſened, thoſe particles are made free enough and ready for action. Now if it be queſtioned, whether the vomiting quality depends upon the ſulphureous or the ſaline particles? My opinion is, that it proceeds from neither of them apart, but from both of them together: becauſe when the former are given diſtinct from the latter, as in the tincture of Antimony; or the latter from the former, as in the ceruſs of it, it never provokes Vomiting. I have elſewhere obſerved that particles meerly ſulphureous or ſaline, ſcarce move the Taſte or Smelling, but that both of them together do very ſtrongly affect thoſe ſenſes: and ſo I ſuppoſe it to be in the peculiar ſenſe of the Stomach, that is to ſay, that that Senſe receives its pleaſure or diſturbance from ſulphureous and ſaline particles mixt together; as alſo, that all Cordials and Vomits conſiſt of ſuch Compoſitions which are either grateful or ungrateful. Stibium (that it may become an active Medicin) is uſually prepared either by it ſelf (as the Glaſs or Flowers of Antimony are made) or with Salts, that is, either with nitrous Salt, as the Crocus of it, or with fixt Salt, as the Sulphur of it; or with acid Salt, as the Butter of it, and *Mercurius Vitæ*, which is made of it. There are many other vomiting preparations of Stibium, but thoſe aforeſaid are of greateſt note, or moſt frequently uſed. Now for the right preparation of thoſe and all other Medicins, you muſt firſt take ſpecial care to chuſe your Antimony pure and unmixed with Lead. In this affair, beſides the brightneſs of it, and the elegancy of its *Striæ* or Streaks; the ſureſt way to try it, is by calcining a bit of the parcel you would buy, with an equal quantity of Nitre, and it is a ſign of its goodneſs if it all turns into an *Hepar* [of a Liver colour] and to droſs; for otherwiſe a part of it ſometimes melts into pure Lead. By this means I once drew out of one pound of Antimony ℥ ij. of Lead.

Wherein the Vomiting power of Antimony conſiſts.

How the Particles of it become a Vomit.

1. Glaſs of Antimony.

Glaſs of Antimony.

Take of the Duſt of choice Antimony q.ſ. *and let it be calcined in an earthen veſſel, keeping it ſtill in motion till it leaves ſmoaking, and gains an aſh colour; then taking it out, melt it in a Crucible, and pour it upon a Table, or into a Baſin; when it grows cold, it will turn to a tranſparent purple Glaſs. The Doſe of the Duſt hereof is from* iv. *to* vj. gr. *and the Doſe of the Infuſion of it in Wine from* ℥ vj. *to* x. *works very ſtrongly.*

The reaſon of the Preparation.

The reaſon of the aforeſaid preparation is (I conceive) this. The Antimony whileſt it is calcining is long kept in motion, to the end that whileſt the ſulphureous particles do plentifully evaporate, the ſaline ones, which are apt to vitrifie, or turn to Glaſs, may be gathered into a cloſer conſiſtence; and afterward, when the Maſs is melted by a fierce fire, theſe ſaline parts, getting hold of the earthy ones too which are attenuated, grow eaſily together into a Glaſs; which alſo by reaſon of ſome ſulphureous particles that are yet left in it waxes red, and is a Vomit. Now that Stibium when robbed of its Sulphur, either in great part or totally, turns into Glaſs, is very evident from this inſtance; to wit, in as much as the Calx or *Caput mortuum* which is left from the Diſtillation of the Butter of Antimony, melts into Glaſs, which yet is white and hath no vomiting quality, for as much as all the ſulphureous particles aſcended and left the Maſs quite deſtitute of them.

2. Flower of Antimony.

Flower of Antimony.

Take a quantity of choice Antimony, that is pulverized, and ſublime it in Cucurbita with an Alembick, or in Earthen Veſſels made on purpoſe, upon a moderate Fire, either by it ſelf, or with Sand or Duſt of Bricks, or calcined Tartar mixed among it: the Flower riſe yellow, Citron coloured and white; of which gather up the whiteſt and keep them for your uſe.

The reaſon of this Preparation.

In this Preparation of Antimony the ſalt and ſulphureous parts, having ſeparated themſelves from the watery and earthy ones, ariſe and knit together; by which means when the Mineral Body is much looſened and diſſolved, and the moſt active parts

Phar. Rat. Part I. (the duller, that rebate their force, being laid aside) are joined into one Body, this becomes an excessive strong Vomit and not very safe to take. The Dose is gr. ij. iij. or iv.

3. Crocus Metallorum.

Crocus Metallorum prepared. *Take of choice Antimony and the purest Nitre of each ℥ iv. pounded severally, and well mixt, put them into a brazen Mortar, and with a live coal set them on fire; they will flame and make a great noise; then let the remaining mass which will be reddish (and called from the colour of it Hepar or Liver of Antimony) be separated from the dross (that lies round about it, partly black and partly white) and keep it for your use: The Hepar is given in the substance to* gr. iij. iv. *or* v. *the Wine of its infusion from* ℥ß. *to* ℥ j. *or* ℥ j. ß. *This works kindly enough, and is the most usual Vomit.*

The reason of it. The reason of this procedure is, because it hath Nitre pounded and mixt with Antimony and common Sulphur: for both mixtures are very easily fired, in as much as both particles, to wit, the nitrous and sulphureous too, that were requisite to any degree of kindling were copiously and intimately conjoined. By this deflagration or burning of it, the Mineral Body is sufficiently opened, and the particles thereof are loosened from each other, and though some part of the Sulphur flew away, yet there is enough left to make it of a Saffron colour, and produce an emetick or vomiting quality, by being joined with the Salt. In this preparation, if by mixing too great a proportion of Nitre the Antimony be calcined above the usual rate, the Mass that is left after the burning of it, being now impregnated with less Sulphur, becomes not red, but yellow, or of a Citron colour, and less apt to make you vomit.

4. Sulphur of Antimony.

How to prepare Sulphur of Antimony. *Take Salt of Tartar, or Wormwood,* ℥ viij. *and having put it into a Crucible, let it melt in* Anemius's *Furnace, then throw in by spoonfuls of crude Antimony powdered* ℥ vj. *let it flow or melt a quarter of an hour, then pour it out into a Silver or a Brazen vessel, and let the Mass being of a Saffron colour be sweetned with frequent ablutions or washings. The Dose is* gr. v. *to* x. *which works more gently and kindly than any other Preparation of Antimony.*

The reason of it. In this Preparation the fixt Salt, being melted by the Fire, opens the body of the Antimony, which is compounded chiefly of Sulphur and acid Salt; for whilest the Salts are so conjoined, the sulphureous particles become more loose, less sharp than the saline parts; and therefore though it be extraordinary red, yet it doth not much, nor very violently provoke the Stomach. Moreover by reason that the Sulphur is more loosened, and the Salt grown freer, the Dust of it easily gives a tincture to Spirit of Wine; which being altogether destitute of saline particles, and consequently deprived of its vomitive quality, becomes a great strengthener of Nature.

The Composition of Antimony and common Sulphur. Now that Antimony and common Sulphur, like, it may be, many other things of the same kind, consist of an acid Salt and Sulphur joined together, is easily proved by many Experiments: For besides that such Compositions are very easily dissolved by fixt Salt; so likewise if at any time they are separated by a sulphureous menstruum, as *Oil of Turpentine, Juniper,* or *Flax,* the sulphureous particles are drunk in by the Dissolver, and the saline ones being left grow easily into Chrystals, which being distilled turn into an acid stagma or distilled liquor. This evidently appears in the Preparation of Balsom of Sulphur. But if the acid stagma, to wit, *Aqua fortis,* or *Aqua Regia,* be poured into powdered Antimony, and the Distillation be over a fierce fire, there will a great deal of Citron coloured Sulphur arise, which is not to be distinguished from the common sort: which is a plain argument, that common Sulphur consists chiefly of sulphureous particles joined with an acid Salt. Out of Sulphur of Antimony, prepared as is formerly described, I make a liquor like Oil, which being the purest Sulphur of Antimony, will gild Silver at the first touch, and is of excellent use in Physick.

5. Mercurius Vitæ.

Take of choice Antimony and Mercury sublimate, of each ℥ vj. *which when you have pounded and well mixt together, distil them in a Glasen Retort by the heat of Sand; there will arise a gummy liquor like Ice, and very corrosive, which sticking to the neck of*

the

the Retort, if you put a live coal to it, will melt and fall down into the Receiver. This Liquor being purified by rectification, will, if you pour Fountain water upon it, sink into an extraordinary white Dust; whilest the watery part in the mean time gains an acid taste like Spirit of Vitriol; and that Dust being sweetned and dried, is commonly called Mercurius Vitæ, *but falsly; because it hath nothing at all of Mercury in it, and except it be warily administred, is oftener the occasion of death than a preserver of life, [as the name seems to intimate.] The Dose is from* gr. iij. *to* vj.

The reason of the Preparation.

In this Operation the acid Spirits of Vitriol and Nitre, being beforehand incorporated with the Mercury whilest it is a subliming [or forced upward by the heat of fire] when they are again loosened by the fire, forsake that their first entertainment, and embrace the more hospitable particles of Antimony, and being elevated with them by the force of the heat, grow together into a substance like Ice; which consists of the whole Sulphur of the Antimony together with a quantity of its Salt, as also the acid stagma, or distillation of Nitre and Vitriol; and by reason of the salt particles it grows hard like Ice, as it on the other hand melts upon the fire by reason of the sulphureous particles. This matter by pouring Water upon it, is precipitated into a white Powder; such as consists onely of Stibiate particles, much like the Flower of Antimony, whilest in the mean time the acid Salts being dissolved in a menstruum, or dissolving Liquor make it become sharp like spirit of Vitriol. But that this Powder hath nothing of Mercury, is evident from this, that being bereft of the congealing Salts, it resumes its former nature of Quicksilver, and is all gathered together in a Retort. Indeed those Salts are easily drawn away from the Mercury, and do of their own accord desert it, whenever they find any more amicable body: and hence it is, that if you boil it, after it is sublimed, with plates of Iron, in common Water, the Salts will presently embrace the Iron, and the Mercury will recover it self again. This Powder is too strong a Vomit, but if you pound it with Sea Salt, and by frequent washings take away its sweetness, it becomes much gentler, and safe enough; in as much as the saline sharp particles of the Medicin are rebated and tamed by Salts of another nature. Moreover if it be put into Nitre, melted in a Crucible, when the sulphureous particles are totally taken away, it quite loses its vomiting quality, and becomes mere Antimony that will make you Sweat.

The Correction of this Medicin.

Stibiate Vomits, and how they work.

So much of Antimonial Vomits, the Particles whereof being dissolved in the Stomach, make a sulphureous-saline tincture, which the fibres of the Stomach imbibing or drinking, are thereby so vellicated or twinged, that the Convulsion which is therein caused, being propagated every way into the whole cavity of it, as also into the Bowels near adjacent, as the Duodenum, the passage of the Gall and Sweet-bread, forces out all that is within them, and pours them into the Stomach, causing the Arteries also to discharge their serous or wheyish Humours; so that violent Vomitings, and such as long disturb us, follow thereupon. But it is probable, that some small part also of this vomitive tincture is received by the Veins, and being carried into the mass of Bloud, by reason that it meets, and struggles, and joins with the Salt, creates precipitations and expulsions of a certain kind of matter: and this is the reason that Distempers of the remote parts, as all cutaneous Diseases, Leprosies and Gouts are sometimes cured by Stibiate Medicins.

How also Mercurial Medicins work.

But Mercurial Medicins (of which we shall now in the next place treat) do this much more effectually; for that they do not onely provoke twingings and vomitive expulsions in the Stomach, but cause like, by their more active particles, that are communicated to the Bloud, many kinds of fluxes and dissolutions, precipitations, and separations of the *Serum* or Whey and other Humours; from whence proceed, besides Vomiting and Purging, discharges by Urine, Sweat, and sometimes spitting: which is the reason that in old Distempers, which are not easily cured, People have recourse to this Medicin as their last refuge.

Mercury or Quicksilver by it self is not purging.

Mercury or Quicksilver, if it be taken plain and by it self, doth not vomit or purge any more than Antimony, or cause any other considerable disturbance in mans body. But if the mixture of it be dissolved, and its active particles being let loose, it be reduced to a Powder, it becomes a most operative and forcible purging Medicin. Now though there are many ways of fixing this giddy, fugitive *Proteus*, and preparing it for Physical uses, yet these are the two chiefest, to wit, either by subliming [or forcing it upward] or precipitating [that is, making it sink.] Preparations of it in the former way are not properly reckoned among Vomits, but most of the latter kind ought to be reduced to this Head. But it will be enough for us to give you a short account in this place of some few thereof that are of greatest note. We therefore observe that Mercury is precipitated either by it self, or with Metals onely, or with Salts onely, or with Metals and Salts together.

How it is made operative.

Phar. Rat. Part. I.

1. *Precipitated by it ſelf.*

1. Mercury precipitated by it ſelf.

Take of the beſt purified Mercury ℥iij. *and put it into a Glaſs made on purpoſe (which being ſomewhat like an Hour-glaſs, conſiſts of a double bottom running out in the ſhape of a Top; but is broad and plain in both, as in the middle narrow, and hath a Nozel with a very ſtreight orifice, reaching from one bottom into the belly of it) and place this Veſſel in an Oven of Sand at equal poize upon a fire that muſt at firſt be ſlow, though afterward quicker, till part of the Mercury turns to an aſh-coloured Powder, and the other part being raiſed into the upper bottom, ſticks there like Quickſilver; then turning the Veſſel upſide down, put the upper bottom into the Sand, and ſo turn the Glaſs for ſeveral times till all the Mercury turns to Powder, which, having broken the Glaſs, you muſt gather together, and waſh in fair water. The Doſe is* gr. iv. *to* v. *or* vj. *It almoſt ever cauſes vomiting, and doth not work at all by ſpitting.*

The reaſon of this Procedure. The reaſon of this procedure ſeems to be, in that the emanation or ſtreaming forth of a continual fire, firſt looſens the body of the Mercury, by degrees diſſolves the particles thereof, and at laſt ſeparates them from each other, ſo that they mutually part, and being broken as it were into ſmall crums, remain diſtinct; from whence it happens, that the moſt active parts, to wit, the ſaline chiefly, and the ſulphureous ones, being ſet at liberty, cauſe great commotions in a Mans Body by vellicating the fibres and boiling up with the Salts: but yet this Precipitate works leſs upon the Salts which are in the bloud, than Mercury præcipitated with Salts onely; becauſe this latter very eaſily cauſes ſpitting, which the former doth not at all. As Mercury, ſo alſo ſome other Mineral Bodies, as Lead, Tin, Antimony, and Iron, are uſually calcined into a Powder or a Crocus by the conſtant heat of fire.

2. Solar or Golden Mercury Precipitate.

Take of Gold purged with Antimony, and ſubtlely filed ℥ j. *of purified Quickſilver, or that which is drawn from Cinnabar and Sublimate* ℥ viij. *and make an Amalgama* [*or Paſte*] *in a Crucible, by throwing the Gold when red hot into the Mercury actually hot; Let this when it is well waſhed with Salt and Vinegar, and ſtrained through a linen cloth, be digeſted in Sand with ſuch a Glaſs and after the like manner as the Mercury precipitated by it ſelf was, till it be reduced to a red Powder; and let it be ſweetned with cordial Waters. The Doſe is* gr. iij. *to* vj. *and works moſt commonly by Vomit onely, nor doth it cauſe ſpitting, as ſaline Precipitates do. So likewiſe may the Lunar Precipitate, or the Jovial, be prepared.*

The reaſon of this Preparation The reaſon of this procedure is the ſame with the former, to wit, that the particles of fire, like ſo many peſtils, pound the Mineral body into ſmall parts, and for a time do ſo break them, that they will not eaſily ſtick together, and unite. Moreover this *Analgama* [or Paſte] by reaſon that the Bodies of the Mercury and Gold are beforehand looſened from each other, will turn to a Precipitate much ſooner than Mercury by it ſelf.

3. Common Precipitate Mercury.

Mercury precipitated with corroſive liquors

Take of pure Mercury ℥ ij. *of Aq. fortis* ℥ iv. *and having diſſolved it, put it into an earthen glazed Veſſel, wherein let it evaporate firſt over a gentle fire till the moiſture be all ſpent; then increaſe the fire, and let it caleine even till the Veſſel be red hot, ſtill ſtirring it with an Iron Inſtrument till it gain a ruddy colour: Let the matter when taken out and powdered, be firſt ſweetned with frequent waſhings in ſweet water, and after that again kindle Spirit of Wine, and pour upon it, and ſo keep it for your uſe. The Doſe is* gr. iij. *to* v. *or* vj. *It works violently enough by Vomit, and cauſeth ſpitting more certainly than any other Precipitate of Mercury.*

The reaſon of this Preparation If you enquire into the reaſon of this Chymical attempt, I ſay, that the Mercury is diſſolved by the *Aqua fortis*, in as much as the ſaline particles of the Menſtruum [or Diſſolver] meeting with the Salts of the Metal, do preſently ſnatch ſuch Salts to them, and conſequently, when by the diſſolution of the mixture all the other particles are ſet at liberty, and expanded every where lie lurking in the pores of the menſtruum; but afterward when the moiſture is conſumed, the ſaline particles that are left, and expoſed to view, do quite take off the force of the Mercurial ones within them, which

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are mixt in every part. Now the reaſon why Mercury being precipitated on this faſhion with *Aqua fortis*, or *Aqua Regia*, grows red, and of another colour than when it is prepared with Oil of Sulphur or Spirit of Vitriol, is partly from the Nitre that always gives it a Flame colour (for Nitre is an ingredient of the former menſtruum, though not of theſe later) and partly from the Mercury it ſelf, whoſe particles when it is diſſolved, ſo long as they are free and not hid in others, are of their own nature red, as you may ſee in Mercury precipitated by it ſelf, and in the diſſolving of it in Oil of Tartar, wherein it leaves a ruddy, that is, a Mercurial Powder.

Why it grows red in this caſe.

This Medicin conſiſting of Salts that are very corroſive, as well as Mercurial particles that are diſſolved, in as much as it extreamly provokes the fibres of the Stomach, cauſes moſt violent Vomiting, ſo that it is rarely given alone for this end. But if at any time it be taken, and having paſſed the Stomach and thoſe firſt paſſages, it be carried into the bloud; in as much as the native Salts thereof are thereby very much fermented, and with them the Mercurial particles being plentifully infuſed, and throughly mingled, are ſo entangled, that they can be diſcharged again no way better than by the *Ductus Salivales*, or Spittle-paſſages (as I have elſewhere ſhewn) for that reaſon this Medicin cauſeth ſpitting in many People before any other.

How Mercurial Medicins work upon the Stomach.

4. Turbith Mineral.

Take of Quickſilver purified, of Oil of Vitriol (or Sulphur prepared in the Bell) purged from the flegm, of each an equal proportion; put them into a Glaſſen Retort, and diſtill them, increaſing their fire by degrees, till all the moiſture be conſumed, and there remain in the bottom a white maſs, which, if you pour clear water upon it, immediately grows yellow. This when it is unſweetned (by frequent waſhing and burning of Spirit of Wine) and dried, may be given from gr. iv. *to* vj. *or* vij. *It works by Vomit ſomewhat more gently than the common Precipitate, and ſometimes alſo cauſes ſpitting.*

The reaſon of the Preparation

The reaſon of this Preparation, as to the Precipitation of the Mercury, is the ſame as that of the former; but the remaining calx, or earthy part, is not red like the former, partly becauſe there is no Nitre in it, and partly becauſe the Mercury being leſs ſubdued, will not endure ſo ſtrong a calcination, as that the Salts being for the moſt part ſcattered or carried off, it may ſhew its own, to wit, a ſcarlet colour; for if to the end it be forced by a violent fire, it will fly quite away; and therefore from the Salts that ſtick to the particles of the Mercury and hide them, there proceeds a whitiſh colour; which being afterward ſomething taken away, there ſucceeds a yellowneſs. Moreover, in as much as the Mercurial particles are not ſo ſtrictly conjoined with the Salts, and conſequently are not brought into the bloud by them in ſo great a quantity, ſpitting is not ſo readily and certainly the effect of this Medicin.

This Medicin may be prepared after a compendious manner, and not leſs effectually thus:

Take of refined Quickſilver, of Oil of Vitriol or Sulphur, of each ℥ ij. *put them into a Crucible, and firſt let all the moiſture evaporate over a ſlow fire; then make the fire ſtronger to the end that the calcined matter may be the better fixed.*

5. Aurum Vitæ.

Take of purified Mercury ℥ v. *of Solis very well purged* ℥ ß. *let them be ſeverally diſſolved in their proper menſtruums* [*or liquor to diſſolve them*] *let the diſſolved matter of both kinds be put together, and by diſtillation in a Retort, let all the moiſture be drawn forth; let the remaining calx be calcined upon a Plate of Iron red hot, that the Salts moſt of them may be carried off, and let the remaining matter be ſweetened by waſhing it in fair water and burning Spirit of Wine.*

6. The Hercules [or ſtrong Medicin] preſcribed firſt by *Bovius*.

This Medicine will be the better prepared, if both the Metallick Bodies are diſſolved in the ſame menſtruum, which by the preſcription of *Thomas Bovius* is thus performed:

Take

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Take of calcined Vitriol and Nitre, of each one pound, diſtil them in an Oven for reverberation, pour the Liquor diſtilled into one pound of Sea-ſalt calcined, in a Glaſs Retort, and let it be drawn forth by the gentle heat of Sand, for it very eaſily ariſes: Let one part of this diſſolve the Mercury, and the other the Gold; after which, putting both the diſſolutions together, draw them off, and by frequent ſuffuſions, adding every time a little leſs than a third part of the ſame menſtruum, diſtil them again till the matter be ſufficiently fixed, which being ſweetened, you may keep for your uſe, as aforeſaid. The Doſe is gr. iij. *to* vj. *or* vij. Or,

Take of purged Mercury ℥ iv. *of filed Gold* ℥ ß. *make an Amalgama* [*or Paſte*] *as aforeſaid, to which when it is waſhed and put into a Retort, pour* Bovius's *forementioned menſtruum, draw it off in an Oven of Sand, and by frequent ſuffuſions, adding every time ſomewhat leſs than a third part of the ſame menſtruum, diſtil it again, till the matter be ſufficiently fixed; then calcine it upon a red hot Iron Plate, and unſweeten it by frequent waſhing and burning the Spirit of Wine. The Doſe is from* gr. iij. *to* vj. *It works indifferently by Vomit, and in as much as it operates, beyond the Bowels, upon the maſs of Bloud, it is helpful often in great Diſtempers.*

The reaſon of both theſe Preparations.

Now, for the reaſon of this Chymical procedure, I ſay, that whileſt theſe two Champions ſtruggling between themſelves, get hold of, and weaken each other, a third (and ſometimes a fourth) comes and binds them together ſomewhat faſter, and breaks them into ſmaller parts. For not onely the Gold by the Mercury, but both of them are diſſolved by the menſtruums, and divided into minute particles; then when the moiſture is drawn away, the ſaline particles of the Metals are joined with the Salts of the menſtruum, whileſt in the mean time the other metallick particles are intermingled, and ſhut up in the pores of the Salts. But yet this combination of theirs is not ſo cloſe, as when the Metals among themſelves, or either of them, with its proper menſtruum, is by ſolution and coagulation reduced into a Precipitate. For in that compound Precipitate the menſtrual particles, as well metallick as ſaline ones, being ſo many and diverſe, cannot all be throughly united: wherefore that matter (as I have often obſerved) is uſually not without much difficulty fixed and reduced to a Calx fit for medicinal uſes; for if the heat whereby the menſtruum is drawn off be too great, the Mercury will riſe, and the Gold that is left will reſume its own nature; but if the fire be weaker than it ought to be, the Salts will not join ſo faſt as they ſhould do with the metallick particles, but may be ſeparated by meer waſhing; ſo that common Water, if poured upon the Precipitate, will quite diſſolve it, and ſwallow into it ſelf the whole matter, in ſo much that you muſt go to work almoſt anew, if you would make this Medicin.

The reaſon of the Hercules of Bovius.

The foundation of this Medicin is Mercury, upon the account of which it is expected that the particles thereof ſhould ferment or leaven all the juices in Mans Body, and promote the expulſion of any heterogeneous matter that is gathered either in the Bowels or in the Veſſels. The Gold ſeems to be added to tame the Mercury, and ſomewhat to rebate and take off the fury of it. Beſides which, the Salts break both the bodies into ſmall parts, and thereby the more eaſily lead them (as it were) into the maſs of Bloud, and all other more retired parts.

The reaſon of this Menſtruum.

In the Diſtillation of that Epicæne or common Menſtruum that *Bovius* hath deſcribed (it being ſuch an one as diſſolves both the Metals) there are notable ſtrugglings and contentions (as it were for Religion and Property) between the Salts: for when the *Aqua fortis* is poured to Sea-ſalt already prepared, it ſeizes (as it were) the Country thereof, and takes poſſeſſion, as of its own Inheritance, driving the ſpirit of the Salt thence like a Perſon disfranchiſed, or baniſhed his own Native Land. This is more plain, if at any time the ſpirit of Vitriol, being poured to Sea-ſalt calcined, be put to be diſtilled; for with the leaſt heat of a Balneum or Bath of Sand, the ſpirit of the Salt will ariſe altogether pure, like one forced out of his Country, when the Stagma, or diſtilled Liquor of Vitriol invades its habitation. Indeed theſe Salts are too near of kin than that they ſhould incorporate; and that is the reaſon that when they are put into an habitation too narrow for them, they being not able to unite, nor cohabit, the ſtronger uſurps a dominion over the weaker, and turns it out of doors.

CHAP.

CHAP. III.

Touching the Cure of exceſſive Vomiting, as alſo of Medicins to ſtop it.

WHere Nature is put into a violent motion, ſhe often goes beyond her bounds, and over-ſhoots the mark, in ſo much that ſometimes ſhe lacks to have a ſtop put to her career. This is evident in Vomiting, if at any time, through the operation of a Medicin, or other occaſions, it be immoderate: and therefore it is the buſineſs of Phyſick, as well to aſſwage, as to provoke this fury in the ſtomach. How many ways and from what cauſes Vomiting uſes to proceed without taking a Vomit, I have formerly declared; but beſides that, it is obvious to our common obſervation that this evacuation, when cauſed by a Medicin, is ſometimes ſo violent, and continues ſo long, that unleſs it be ſtopped by the help of Art, a mans life is thereby in manifeſt danger. As therefore in the Practice of Phyſick Emetick Medicins [or Vomits] are of neceſſary uſe; ſo ſometimes, to ſtop that way of diſcharging [what is in the ſtomach] (as often as it is exceſſive or preternatural) we muſt uſe remedies quite contrary to the others, or Antidotes againſt Vomiting. I therefore ſhall ſhew, Firſt, what Medicins cure exceſſive Vomiting, that is cauſed by taking a Vomit, and then, in the ſecond place, how and by what remedies Phyſicians ſtop preternatural Vomiting, which proceeds from other cauſes.

Immoderate Vomiting proceeds either from an Emetick Medicin, or other Cauſes.

As to the former, Vomiting that is cauſed by a Medicin, becomes more violent, and continueth longer, becauſe the Animal ſpirits being extraordinarily provoked, and ſet on fire (as it were) do not eaſily or preſently lay by their fury, but being often exploded [or diſcharged] cauſe violent motions to vomit, which they ſeveral times repeat. Moreover, that exploſive force being begun in the ſtomach, is propagated oftentimes into the ſpirits that inhabit the neighbouring parts, and from thence into others, till at laſt ſometimes it gets into the whole race of them; in ſo much, that after Vomiting there come gripes and convulſions in the bowels; after that, in the parts near the heart, and laſtly, in the whole body, to the manifeſt hazard of a mans life.

The ſpirits are irritated or provoked either by a Medicin onely, which is diſproportionate to them in quantity or quality; or over and above by other humours, as Gall, ſharp Serum, and other things poured into the ſtomach whileſt we are vomiting. Moreover in ſome People the Animal ſpirits are ſo tender and elaſtical, that when there is any motion to vomit, though but ſmall, not onely thoſe which reſide in the ſtomach, but alſo all that are near it, are ſtirred into convulſive exploſions. And hence it is, that many People when they have taken a Vomit, complain of the Spleen, [pains in] the Womb and other Bowels, as if they were very much out of order, and not eaſily recoverable, imputing the whole matter to vapours raiſed by the operation of ſuch a Medicin, when really and truly that comes to paſs by no other means than that the Animal ſpirits are put into too brisk a motion, and are not eaſily to be reduced.

The reaſons of the former are explained.

In exceſſive Vomiting, cauſed by a Medicin, the Patient muſt be preſently put to Bed, and plyed very carefully with outward as well as inward remedies; and firſt of all, to appeaſe the Inhabitants of the ſtomach, either you muſt uſe an hot fermentation made of the decoction of Wormwood of Pontus, Mint and Spices in red Wine, or a Cake made of Crums of toaſted Bread, and dipped into hot Claret. Give the Party a Clyſter of Milk and Treacle: let him be rubbed with warm clothes and bound hard above the Knee, to prevent Convulſions in thoſe parts. In the mean time let the ſtomach be kept empty, unleſs in caſe of fainting; but as ſoon as he can take any Food or Phyſick, let it be Cordial Water, or hot burnt Wine. In an extraordinary commotion, if the Pulſe allow it, *Treacle of Andromachus*, or *Diaſcordium*, as ſometimes diſſolved *Laudanum*, or *Tincture of Opium* are good.

The Cure of it.

In preternatural Vomiting, that is cauſed by other means, you muſt conſider, whether it be critical or ſymptomatical. In the former caſe, we are to do nothing raſhly or on the ſudden; let not ſuch a diſcharge, if the Body can bear it, be ſtopped by any means; but let the paſſage of the matter which is to be expelled, be made more eaſie or haſtened, or turned ſome other way. And hence it is, that when any maukiſhneſs, or motion to vomit comes upon a man, it is proper to give him Ale, either in Poſſet, or by it ſelf, or altered with the leaves of *Carduus* boyled in it, and ſometimes alſo *Oxymel*, or *Wine of Squils*, or *Stibiate*. So likewiſe ſometimes a Clyſter will do well, and otherwhiles a gentle Purge carries off the matter that ſwells in the ſtomach an eaſier way through the Guts.

Natural Vomiting is either critical or ſymptomatical.

In

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The latter is either idiopathical or affecting one proper part, or sympathical affecting two, by consent.

In symptomatical Vomiting the conjunct cause (as I told you before) either is in the stomach, where it produces such an effect, or in other parts, where it causes Convulsions, and by communication of the Nerves, causes motions to vomit in the stomach, as in fits of the Stone in the Reins, the Colick, Fits of the Mother, Meagrim, and many other Distempers it usually happens; the Cure of which sympathical Vomiting depends upon the curing of the primary or original Disease.

What Method we ought to use when the Stomach is first affected.

When the stomach is first affected, the reason is, because the nervous fibres thereof being irritated above measure, set the other motive ones upon contractive expulsions. But they are provoked by an improportionate object, to wit, in as much as a certain matter lies upon them, which they cannot well concoct, subdue, or thrust down into the Guts; but must of necessity cast it out as soon as possible by way of Vomit. That matter grows so incongruous or unruly, either through its own illness, as it offends in quality or quantity, and disturbs the nervous fibres; or through fault of the stomach, that is, when the tone of it is loose, and the fibres thereof so weak, that they cannot master, or endure so much as the Chyle it self, much less excrementitious humours, but being impatient of all burdens: throw off all that is within, by Vomit. Of both which cases, since there are several instances and various ways of bringing it so to pass, I will here briefly lay down some of the chiefest, together with the remedies and the reasons of them.

The matter that gives the Vomit, being in the stomach, is either poured into it from other Vessels, or through defect, or depravation of concoction, is therein generated; but in both respects the present load ought first to be removed, and then care to be taken how to prevent its farther growth for the future.

That therefore the impure conflux of viscous matter may be cleared out of the stomach, let the Patient take a gentle Vomit of Whey with *Carduus* infused in it, or *Oxymel*, or *Wine of Squils*, or with the Decoction of *Camomile Flowers*, *Roots*, the Dissolution *of Salt of Vitriol*, or other the like Medicins; and then let the reliques be carried away gently by Clysters or Purging, with Mastich stomach Pills, Gum, or *Tinctura Sacræ*, or the Infusion of *Rhubarb*. Moreover when the Bloud being impure or putrid, brings new supplies of incongruous matter into the stomach, either through the Arteries or Choler vessels, which oftentimes overflow, and thereby disposeth a man to vomit, Bloud-letting sometimes is good, and therefore vomiting in Women great with child is frequently cured by this kind of remedy. Those things also are helpful, that so temper the Bloud, as that no adust or dry filth may be generated in it. Hence Whey, drinking the Waters, the Juices of Herbs, Sal Prunella, and the like, very often remove that disposition to vomit, in as much as that they set the Bloud a float, and carry the drossie part of it another way. And these kind of remedies too will be useful, if frequent and daily vomiting proceed from the contention and struggling of the Gall and Sweetbread juice which rejounce (as some think) into the stomach.

How Vomiting that arises from a vitiated Stomach is to be cured.

That Vomiting is more frequent and harder to be cured, which proceeds from incongruous matter, that is consequently emetical [or vomitive] and generated within the stomach; in as much as all things which the Party eats, through the vitiated ferment of the Bowel, degenerate into a provoking kind of putrifaction. Wherefore in this case, when the filth of the stomach is carried off by gentle Purges, the Remedies commonly called Digesters, are wont to be made use of; which, according as the fermenting juice of the stomach (which is most commonly of a salt nature, and sometimes of a sulphureous) differs either in fixedness, fluidness, or adustness, are of divers sorts, and work sometimes one way and sometimes another.

Remedies against the too acid ferment thereof.

In belching and sower Vomitings, try the Medicins following, and take your measures for the use of them from the help you find by them.

Take of the Powder of Cuckow-pintle compound ʒ j. ß. *of Salt of Wormwood* ʒ ij. *of Sugar of Roses* ʒ iij. *make a Powder and give* ʒ j. *of it in the morning, and at five of the Clock in the afternoon, in a small draught of Mace Ale, and a Toast, or in distilled Water, or the tincture of Wormwood of Pontus.*

Take of Powder of Ivory, Crabs eyes, and red Coral, of each ʒ ij. *of calcined Coral* ʒ j. *of red Sanders and Cinamon of each* ʒ ß. *make a Powder. The Dose is* ʒ ß. *after the same manner.*

Take of the Powder of Lignum Aloes, Citron-coloured Sanders, and Winter Bark, of each ʒ ij. *of the whitest Chalk* ʒ vj. *of white Sugar* ʒ ß. *of Gum dragant dissolved, with Mint Water a convenient quantity, make a Paste, and form it into Trochies or Balls*

Balls of the weight of ʒ ß. *of which let the Patient eat* iij. *or* iv. *three or four times a day.* *Phar. Rat.* Part I.

Take of the Tincture of Salt of Tartar ʒ j. *The Dose is* ℈ j. *to* ʒ ß. *twice in a day in distilled Water made on purpose.*

2. In sharp and hot Vomitng Medicins that have acid and vitriolick Salt in them are more proper. *Against the too sharp ferment of it.*

That famous Medicin of *Riverius* takes place in this case.

Take of the Salt of Wormwood ℈ j. *give it in a Spoonful of the juice of Limons.*

Take of prepared Coral ʒ ij. *of Salt of Wormwood* ʒ j. ß. *of juice of Limons* ʒ iv. *let them stand in a Glass big enough, and put to them of strong Cinamon Water* ʒ ij. *The Dose is one Spoonful or two twice in a day, shaking the Vessel first.*

Take of the Powder of Ivory and Coral, of each ʒ ij. *of Vitriol of Mars* ʒ j. *of white Sugar* ʒ j. *mingle them and divide them into* 6 *or* 8 *parts, and let the first part be taken twice in a day with a convenient vehicle, or matter to convey it down in [as Wine or the like.*

In this case Mineral Waters that are purging, having a great deal of Nitre in them, as likewise Iron stone Waters, yea and our artificial Chalybeates or Steel-waters too, use to afford extraordinary help.

3. If the Stomach at any time by changing most things that are taken into it, to choleriek and bitter putrefaction (as it is often used to do) doth thereby incline to frequent Vomitings, then such remedies are most proper as are acid and bitter. *Against the bitter ferment of the Stomach.*

Take of the Elixir proprietatis ʒ j. *The Dose is* ℈ j. *twice in a day in a convenient vehicle.*

Take of the Powder of Rhubarb gr. xxv. *of Salt of Wormwood* ℈ j. *of Cinamon water* ʒ ß. *of juice of Limons* ʒ j. *mingle them, and take it either by it self, or with any other Liquor.*

Take of the Powder of Cuckowpintle comp. ʒ j. ß. *of white Chrystalline Tartar* ʒ iij. *of Vitriol of Mars* ʒ j. *of Sugar* ʒ ß. *make a Powder. The Dose is* ʒ ß. *or* ℈ ij. *drinking upon it each morning a draught of the Tincture of Wormwood of Pontus, or Coffee.*

Take of the Powder of Crabs eyes ʒ ß. *of Chalybeate Tartar* ʒ ij. *of white Sugar* ʒ j. *make a Powder. The Dose is* ʒ ß. *with a convenient vehicle twice a day.*

The cause of frequent and habitual Vomiting proceeds oftentimes not so much from the matter irritating the stomach, as the weakness of the nervous fibres thereof, and their too great aptitude to be provoked; in as much as they being very tender and infirm, can neither concoct what comes in, nor endure the burden or load of them; but on the contrary are presently disturbed by any thing that lies upon them, and consequently, in order to expel and drive out whatever is troublesom to them, excite the fleshy fibres to put themselves into a motion of Vomiting. *Vomiting caused by the weakness of the Stomach.*

Of this Indisposition there are two several cases: to wit, either this weakness of the stomach, being in the fibres themselves, is caused by inordinate ways, as by Cropsick-ness, Debauchery, for last nights drinking constantly and to excess, frequent guzling of Wine, or hot Waters, and other errours in our Diet; in as much as the fibres being beyond measure distended, or too much heated, and as it were roasted, cannot admit, or keep in them, animal spirits enough: Or secondly, those fibres, though well enough disposed in themselves, and through the obstruction of the Nerves in some part or other, are deprived of the due afflux of spirits, and consequently being languid and slack or lank, cannot indure what is brought in, but presently force it upward by way of Vomit. So I have known several persons, that without any uncleanness of the stomach, or languidness contracted by inordinacy, being troubled with a kind of Palsie in this part, have wanted an appetite, and were subject to perpetual Vomiting. *Vomiting caused by weakness of the Stomach. Two cases.* *Either the fibres are too much relaxed; Or the Nerves are obstructed so as that the animal Spirits cannot flow into them.*

In the former of these cases, such remedies are proper, as may by their styptick or restringent virtue cause the fibres that are too much distended, and thin, to shrivle and *The Cure in the former case.*

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contract themſelves into a leſſer ſpace; and alſo ſuch, as by their grateful allurements may entice the ſpirits thither in greater plenty, and likewiſe refreſh or recruit them, when weak.

Take of Elixir of Mynſichts Vitriol ℥ j. *The Doſe is from* gr. 10. *to* 15. *twice or thrice a day, in a ſpoonful of the following diſtilled Water, drinking of the ſame thereupon* 7. *or* 8. *ſpoonfuls.*

Take of the tops of Cypreſs m. vj. *of the leaves of Clary* m. iv. *the outward rinds of* 12. *Oranges, Cinamon and Mace of each* ℥ j. *of the roots of Cyperus* [*one kind of Galingal*] *and the leſſer Galingal, of each* ℥ ß. *which having cut and bruiſed, pour to them* ℔ viij. *of Mum. Diſtil them with the common inſtruments.*

Take of the Tincture of Balſam of Tolu, and of the Tincture of Salt of Tartar extracted ℥ j. *The Doſe is* gr. 20. *with the ſame vehicle. Tincture of Wormwood prepared with the ſame menſtruum, may be tried.*

Take of the Powder of Wormwood leaves, of Myrtle dried in the Sun, of each ℥ ij. *of Cinamon, and the flowers of red Roſes, of each* ℥ j. *of Cubebs, of the roots of the leſſer Galingal, of each* ℥ ß. *of red Coral* ℥ j. *make of them all a ſmall Powder, then of the whiteſt ſort of Sugar, diſſolved in Cinamon Water, being made into Tablets* ℥ vj. *and let the weight of each Tablet be* ℥ ß. *Let the Patient eat one or two of them at any time when he will.*

Take of the Conſerve of red Roſes vitriolated ℥ iv. *of preſerved Myrabolans* ℥ vj. *of Ginger pickled in India* ℥ ß. *the ſpecies of Jacinth* ℥ ij. *of the reddeſt crocus of Iron* ℥ j. *of Syrup of Corals, as much as will ſerve, and make an Electuary. The Doſe is* ℥ j. *twice a day, drinking upon it a draught of the diſtilled Water.*

How the Palſie in the Stomach may be cured.

2. In caſe of weakneſs or ſlackneſs in the tone of the ſtomach by reaſon of an obſtruction ſomewhere in the Nerves, thoſe Medicins which are antiparalytick, or good againſt the Palſie, together with ſtomach remedies too, will be of ſpecial uſe.

Take of Elixir Proprietatis tartarized ℥ j. *The Doſe is* ℈ j. *twice a day with the Water formerly preſcribed. Tincture of the Salt of Tartar, of Coral and Antimony, may be uſed the ſame way. In this caſe Spirit of ſweet Salt, as alſo Spirit of Sal Ammoniack, or the flower of it, do a great deal of good. Vomits, Purges, and even Sweating Medicins are oftentimes helpful. I have known this Diſtemper cured ſometimes by bathing in our Baths at* Bath.

SECT.

Phar. Rat. Part I.

SECT. III.

CHAP. I.

Of Purging and Purgative Medicins.

PUrging ſeems to be a motion or diſpoſition quite contrary to vomiting, or rather vomiting at the wrong end, becauſe in one as well as the other we ſet forth from the ſame barriers of the ſtomach toward a different Race-end. For as in Vomiting, the inner fleſhy fibres of the ſtomach being inflated or blown up at their left ends by the ſudden incurſions of the ſpirits, and conſequently, being contracted, cauſe the bottom and ſides of it to be drawn together, and upward toward the left orifice, that ſo the matter therein contained may be thrown out the upper way; ſo in Purging, the ſame fleſhy fibres, being in the ſame manner inflated at the right ends, force all the body of the ſtomach together, and make it lean toward the Pylorus, which cauſes an evacuation by ſiege. Now as the expulſive motion begun by the ſtomach is continued, in Vomiting, through the Weazon, ſo is it in Purging, through the Guts; and is propelled on both ſides by the fleſhy fibres, from one part to another, till it get out. In both caſes the motion of the Stomach is violent, and in a manner convulſive; nay now and then the one is changed into the other. For Purgation, if cauſed by a Medicin too ſtrong and quick, does oftentimes produce Vomiting; and ſo on the other ſide, a Vomit is many times attended with a Purge: the reaſon of which is, becauſe the animal ſpirits being vehemently provoked, and exploded or diſcharged, fly differently ſometimes into theſe, and ſometimes into thoſe ends of the fleſhy fibres; ſomething after the ſame manner as if you ſpur a metled Horſe too much, you will make him one while run forward, and another as much backward.

Purging contrary to Vomiting.

Purging therefore is an expulſive motion in the Stomach and Guts, which by reaſon that their fleſhy fibres are ſwiftly and regularly contracted, is more frequent and nimble; whereby not onely the Chyle and Dregs of it, but alſo the droſſie and corrupt part of the Humours which are there engendered, or brought thither from other places, are puſhed on from part to part till they are diſcharged by ſiege, as through a Sink, or Common-Sewer. For the ſtomach being irritated by the ſharp particles of the Purge, and ſo contracting it ſelf more nimbly and cloſely toward the Pylorus, poureth whatſoever is in it forth into the Duodenum, whileſt at the ſame time the Guts alſo being twinged by it, repeat more frequent and greater expulſive convulſions, whereby the greateſt part of what is contained in them, that was either gathered thither before hand, or attracted and drawn forth at that inſtant, is thrown out. Now Purging is onely the violent and forced performance of that evacuation, which Nature when ſedate and undiſturbed, deſigned to effect leiſurely and by intervals; which alſo, when ſhe is provoked ſhe cannot perform without ſome ſort of tumult and diſorder. It is therefore requiſite (in my opinion) to the more perfect knowledge of the Nature of Purging, that we firſt ſhew what kind of matter is properly contained in the ſtomach and Guts, and then what comes thither from other parts, to be evacuated by Stool. Which being premiſed, it will be eaſie to explain how and with what difference Purging Medicins perform their operations.

The deſcription of Purging.

1. As to the firſt, The chief contents of the Stomach and Guts are the maſs of Chyle, and the dregs of it that remain after the diſtribution of the nutritive juice, the ſlimy matter in theſe Entrals, which ſmeers over the hairy veil, and the water that ſticks in the glandules thereof; to which you may add the ſerous water iſſuing forth from the mouths of the Arteries, as alſo the droſſie parts of the Bloud and Humours that are conveyed into the inner cavities thereof through the Choler veſſels, the Sweetbread paſſage, mouths of Arteries, and likewiſe through the ends of the nervous fibres, and it may be other ways beſide. For very frequently the filth of the whole Body is thrown out by paſſages in the Guts as it were through a Sink; which filth if it ſettle within, doth either ſwell, by reaſon of its great quantity; or is ſo ſharp, that by lubricating [making glib] or ſtimulating [pricking or ſpurring, as it were] the belly, cauſes more frequent and plentiful evacuations.

The chief contents of the Stomach and Guts, that are thrown off by Purging.

2. Beſides this kind of contents, there is alſo another ſort reſulting from them, and

wind.

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The production of it in the Bowels.

that is Wind, which being usually created in the Stomach and hollow of the Guts, more than in any other part of the whole Body, seems to be thus produced: whilest the food (which is concocted and digested in the Bowels) is dissolved by the ferments and heat of them, a great number of *effluvia* [or particles that flow from it] go out of it; which if they could get a free and open passage, would flie and vanish into air; but being shut up in a membrane and crouded together, make an heap (as it were) of vapours like unto wind, which oftentimes bloats and distends the Guts, and where it can find vent goes forth with violence, promoting evacuation in its passage; but when it is shut up and kept in, it causes very frequently the Gripes, and many times swellings in the belly. The Wind that is created in the Bowels by the dissolution of Food, is generated after the like manner as when Pearl or Coral, or other concrete or hard matter is put into a matrace [a Chymical Vessel] and dissolved by their menstruums [or dissolving Liquors:] for in such dissolutions there are a great many vapours that flow forth, which if they are strictly kept in, force the containing vessel to break and fly in pieces: so when the Food in the first passages is either dissolved, concocted, or fermented, a vast number of such small particles flow from it, which being gathered together and shut up within the membranes, cause wind, to the more copious increase whereof, there are also other things that contribute. For it is notably produced by the struggling and boyling of juices which are not easily to be mingled. For whilest foreign humours, or heterogeneous matter, and especially Medicins, ferment with the other things which are contained in the Stomach, a great number of particles that flow from them, are gathered into a vapour by the mutual refraction of them. Moreover since many exhalations arise on every side from the boyling of the bloud, part of them breaking forth out of the Arteries into the cavities of the Bowels increaseth the stock of wind which is there already generated. But to the further augmentation of Wind, the extensions and convulsive swellings of the Bowels do likewise conduce. For whilest the membranes by reason of the greater explosions and inordinate excursions of the Spirits are very much distended, the inward cavity, like a bladder blown full of wind, is much enlarged, in so much that part of the Humour inclosed within that empty space (which is like a cucurbit after the flame is out) is rarified into wind; which afterward, when the membrane slackens, or remits of its distension, breaks out with violence, or ever now and then tumultuously breaks through the next passages of the Guts. For this reason, when any part of the Guts is obnoxious to convulsive extensions, through inflammation or setling of sharp Humours, there is wind also immediately produced, and grows extraordinary troublesom. Having opened a great many Bodies that died of an inflammation in the Colon, I have found in all of them the Guts extremely stretched, and as it were blown full of wind; which no doubt happened, not because the *flatus* or wind was first generated, and then had distended the Bowels; but the membranes being mightily stretched by the spirits which were much provoked, and exploded or discharged within their fibres, therefore these *flatus* or parcells of wind were produced secondarily, and by consequence to fill up the void or empty space. From this cause I before intimated that the Tympany did arise, and shall shew the same perhaps in another place more at large. Whereas therefore the increase of wind uses to be very plentiful in the Stone in the Kidnies, the Colick, Hypochondriack distemper, and Fits of the Mother, that is not the cause of such diseases, but the effect onely; that is to say, when in the Fits of such Distempers the membranes are extended, and the hollow Bowels swell with spirits which are violently exploded or discharged, a kind of moisture therein inclosed, is presently resolved into vapours (from which wind proceeds) to fill the empty space. And that is the reason that when the distention of the affected part is slackened, the *flatus* or wind that was so suddenly produced, is pushed forward by the falling together of the membranes, into some other part. So much for that which is contained in the Stomach and Guts, and is the object of Purging Physick, let us now in the next place inquire, as to its subject, what kind of motion that of the Bowels is, whereby the matter contained in them, being softly moved forward, is leisurely, and by intervals thrown out, or being hastily tumbled down, is voided in an hurry.

Wind is sometimes the cause and sum times the effect of extensions in the Bowels.

How wind is generated in convulsive Distempers.

Of the natural expulsive motion of the Guts.

Because, for the preserving of life, all Animals stand in need of frequent and plentiful feeding, it is therefore necessary that the reliques of the Food, which is constantly altered into nutritive juice, should be seasonably carried off, and that thereby the dregs of the old nourishment should ever now and then give place to its new supplies. For when the more pure and perfect part of the chyle (in which the elements being totally dissolved, are freed from the bonds of mixture) are squeezed into the chyliferous or chyle-carrying passages, that which remains, partaking of thick sulphur and sharp salt, contracts a grievous stinking scent; wherefore it ought to be removed

removed out of the Neighbourhood of the new mass of Chyle into the bigger Guts, and at last be thrown quite out of the Body. Which that it may be the better done, Nature hath planted an expulsive motion in the Guts, (that is almost constant, and as it were solemn or at certain times) whereby the dregs of the nourishment are pushed still softly on, and hath appointed many Spurs as it were, or incitements to the same.

How it is performed.

1. As to the first, the expulsive motion of the Guts as well as of the Stomach, is performed altogether by the fleshy fibres of each bowel, that compose the middlemost coat, of which I have observed two orders or rows in the whole passage of the Chyle, to wit, from the *Oesophagus* or Weazon, even to the *Rectum*, or Arse-gut. The outward row of fibres in the Guts, runs all along upon the surface of them in a strait line, as you may see it expressed in Fig. 2. of the sixth Table: but the inward row or rank consists of annular or ringy fibres that encompass the passage of the Guts in every part, with thickset circles, as is represented in the third Figure of the same Table. And when both these kinds of fibres are contracted, at the same time they streighten the cavities of those Entrals in every dimension; which being performed successively and in order, as it were by several joggings of the matter conteined, it must necessarily follow that all things therein contained must be pushed still forward slowly and with a kind of creeping motion, the former part being continually thrust on by the latter. This motion of the Guts is commonly called the Vermicular or Wormy motion, because as when a Worm creeps it is continued from one part to another like the creeping of a Worm; and according to the necessity of Nature, it is more or less performed at all times, even when we our selves do not perceive it; because indeed those Bowels ought to disburthen themselves by degrees; and lest they sometimes should be idle and desist from this their task, they are upon occasion stirred up with many incitements.

How the expulsive motion of the Bowels is excited.

1. With the load and noisomness of the excrements.

For first of all the very bulk of the Chyle and the dregs of it, oppressing the nervous fibres of the inner coat, upon which it lies, with the weight of it, and consequently provoking them, impresseth upon them a sense of trouble; whereupon they presently, being already satisfied with nutritive juice, and weary of any other load, excite the fleshy fibres to vermicular or worm like contractions, in order to thrusting of the matter contained still outward. When, in this manner, the contents or stuff contained in the belly, being pushed still leisurely forward from one part to another, are come down near the end of the Colon, because at that time there is a pressure felt by the musculous part of the *Rectum* or Arse-gut, therefore the voluntary motion helps the natural, whereby after the sphincter [or muscle that shuts the *Anus*, or Arsehole] is opened, and the muscles of the lower Belly pressed together, the excrements are forced out. Moreover the Instruments of Respiration do somewhat contribute to this expulsive motion of the Guts, in as much as they continually moving the lower Belly, to and fro, cause that which is contained in it, by their shaking of it, to move slowly forward.

2. By many other accidental causes.

Besides the forementioned irritation or provocation, by which the fleshy fibres are moved by instinct of Nature, and constant custom to frequent, and almost continual worm-like contractions, there are also some other incitements and various instigations that upon occasion do increase or hasten those expulsive endeavours, and oftentimes force them into convulsions; in so much that the Belly is compelled to cast forth its load in great plenty, with great impetuosity, and as though it were moved by a Purge. Now those internal provocations of the Belly are, first of all incongruous or immoderate diet, the corruptions of bad chyle, the copious dregs of the bloud and nervous juice, or sharp humours that flow from the Glandules and other Emunctories or Drains of the Bowels, and especially out of the Gall-bladder and Sweet-bread passage; yea and serosities [or wheyishness] or Humours that are superfluous and incongruous, settling within, and proceeding from the Bloud, Nerves, or habit of the Body. Of the chiefest whereof (because in Purging they often discover themselves, and heighten the operation of the Medicin) I shall speak particularly, and in short.

Food that is incongruous, &c.

1. First therefore Food, if in the concoction it be at any time perverted, or cannot be digested, very frequently causes a Lask; as after hard drinking over night, by inordinate Diet, eating things disagreeable, and other errours, or from depravations the Stomachs ferment often happens. Yea, for want of concoction, and sometimes through obstructions in the Mesentery or passage of the Guts, from too much sliminess of the glandulous coat, or in the mouths of the vessels, the distribution of the nutritive juice is hindered, and consequently the whole matter that is taken in, being gathered and restrained in the first passages, produceth more frequent and plentiful evacuations.

2. The

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Gall and the Sweetbread-juice.

2. The dregs of the Bloud, and the nervous juice being gathered together in the Glandules of the Bowels, the Bladder of Gall, the Pancreatick or Sweet-bread passage, and perhaps in other receptacles too, if at any time they overflow through fulness or irritation, and are abundantly discharged into the cavities of the Guts (in as much as they there twinge the nervous fibres, or boyl up with other juices) they oftentimes cause a Lask. The Gall seems to be a kind of natural Purge, which flowing in a great quantity out of the Choler Vessels, causes Purgation of its own accord.

Humours out of the Bloud, the Nervous juice, the habit of the Body &c. move us to evacuation by Stool.

3. The Purgative matter being sometimes transmitted from a still more remote region, to wit, from the mass of Bloud, the nervous Juice and its emunctories, or from the whole habit of the Body into the Guts, provokes the nervous fibres thereof, and consequently excites the fleshy ones into expulsive convulsions. For in the aforesaid parts and places, and especially in the mass of Bloud, the ill superfluous humours that swell there, being not easily or sufficiently to be purged by Sweat, or Urine, oftentimes retire inward, and flow out at the mouths of the vessels that are in the Guts and gape very thick to discharge them, whereby they cause frequent and waterish Stools. Yea sometimes the Bloud it self, when vitiated in its constitution, and apt to coagulate, if it circulate not readily through these small Vessels, breaks out frequently in a great quantity, and produceth a Dysentery. But you may observe, when the external pores are bound up by the cold from without, or that Tumours or Swellings in the Skin, do suddenly disperse themselves, that they are commonly attended by a Looseness. I have known many People who have been subject to be bound in their Bodies, to have been cured with this sort of remedy; to wit, by rising early in the morning out of their Bed, before the usual time. For look how much is taken away from the wonted perspiration, so much is added to the lubricating [or making glib] the Guts.

These things being thus premised concerning the divers sorts of matter contained in the Guts (as well that which it generated there, as that which comes out of other places) as likewise touching the expulsive motion (both natural and constant, as well as violent and compelled) of these Bowels, and also of the various incitements or provocatives, whereby the Belly either of its own accord is naturally loosened, or inordinately disturbed, it will be easie to shew you how, and with what difference Purging Medicins move the Stomach and Intestines to evacuations, and cause that which is in them sometimes severally, and sometimes jointly to disembogue.

How Purges work upon the Stomach and Guts.

When Purging Medicins are taken in a liquid form they are immediately ready enough to operate; but if they consist of a solid substance, and being so swallowed into the Stomach, are dissolved and impregnated by the ferment thereof, they make as it were a kind of Tincture, which in the same manner as the Purging Liquor becomes Cathartick [or evacuating] as follows. That kind of Liquor being shut up first in the Stomach, and then in the Guts, immediately impregnates the hairy threds of the inner coat with its glandules, and whilest it sticks close to them, the particles of it enter into the nervous fibres, and bloud-carrying as well as chyle-carrying vessels, provoking each of them, as also the choler-passage, and that of the Sweet-bread, to give up and spew out, as it were, that which is in them. In the mean while, when the nervous fibres of the inner coat are twinged partly by the Medicin that they have drunk in, and partly by the humours squeezed into the cavity of it, the fleshy fibres of the outward coat begin to suffer expulsive contractions, whereby to remove all that which is troublesom to them. How these things are performed; first in the Stomach, and then successively in all parts of the Guts, and what kind of Humours are drawn forth in the whole passage, we will consider a little more accurately.

How they act in the Stomach.

1. As to the Stomach, it seems to be as follows; that is to say, the Cathartick or Purging Tincture being diffused in the Stomach, doth first impregnate the hairy threads of the inner coat, and sticking fast to them, is from thence by degrees delivered over to the nervous fibres; which having entered, and quickly filled, till they are sated with it, it begins at last to irritate or provoke them: and they being thereby presently shrivelled up, endeavour to dissolve or discharge the Liquor that they have drunk in together with their own juice and the slimy flegm that is between the wrinkles of the Stomach. Moreover some other particles of the same Medicin (whilest it stays in the Stomach) get into the mouths of the Vessels and Glandules, which they twinge, and make them to disburden themselves of serous matter and other Humours. So whilest the bottom of the Stomach and the nervous fibres are oppressed and provoked by such offensive things as these that are in it, the fleshy fibres being excited into expulsive contractions, draw the bottom and sides of the Stomach upward, and make it lean toward the *Pylorus*, that so the load within, together with the Medicinal Tincture, may be cast forth and transmitted into the Guts. Hence for a time the

Stomach

Stomach enjoys ſome quiet, till the nervous fibres by drinking in a new ſtock of the ſame Tincture, that ſtill ſticks partly in the hairy threads, are again provoked; and when by that means a new load is poured into the cavity of the Stomach, and there diſturbed, the fleſhy fibres repeat the ſame expulſive contractions to throw it out; and thus are theſe things performed many times one after another, till the virtue of the Medicin be quite and clean waſhed out of the hairy threads, and that the ſpirits which reſide in the fibres remit their heats; which ſometimes eaſily and quickly comes to paſs, in ſo much that the Stomach after one or two hours, is free from all offence which the Medicin gave it, and the remaining part of the diſturbance is altogether removed into the Guts. Yet it frequently happens, that preſently after taking of a Purge ſome People Vomit very exceſſively, and that notwithſtanding they have thrown up the Medicin, yet they Purge very plentifully afterward. The reaſon of which is, that the irritation being too violent at the beginning, cauſes ſtronger convulſions, that is, ſuch as happen in vomiting: but then when the force of that provocative is over or remitted, the gentler contractions grow purgative. For the virtue and manner of operating in a Vomit and a Purge doth not differ onely in their ſpecifick qualities, but alſo chiefly in this reſpect, to wit, that the offence given by the provocation of a Purge may be longer and more eaſily endured, and at laſt tranſmitted to the Guts, but not ſo of that which is cauſed by a Vomit. But foraſmuch as after the operation of a Purge that hath wrought plentifully by Stool, People ſometimes vomit, the reaſon ſeems to be, becauſe the Tincture of the Medicin which was deeply drunk in by the hairy coat, is not eaſily wiped away: whereupon, after many vain motions to evacuate, at laſt a contractive motion to vomit cleareth it quite away. 'Tis common for men, if they eat before their Stomachs are cleanſed of the Medicin, to vomit mightily and be very ſick withall; and the reaſon is, becauſe through the hindrance or depravation of concoction, the chyle degenerates into an incongruous and irritating putrifaction: though for the moſt part a Purge ſlips out of the Stomach too ſoon, and without ſweeping away the dregs thereof, but layeth out its greateſt forces upon the paſſage of the Guts. Now how that comes to paſs, is the next thing that falls under our conſideration.

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The cauſe of the frequent repeated motions to Purge.

2. The Tincture of the Purging Medicin being thrown out of the Stomach, and thence carrying along with it a ſort of excrementitious matter, flows into the Guts; where it preſently impregnates the threads of the hairy coat in its paſſage through the *Duodenum* and upper part of the *Ilium*, ſticking faſt thereunto; after which the particles of the Medicin being more plentifully diffuſed about thoſe parts, get into the nervous fibres, and likewiſe into the paſſages of the Glandules, and other veſſels, provoking the Spirits that reſide in them, fermenting with the humours that abound therein, and forcing them out as it were by ſqueezing or milking of them, in ſo much that that cauſes a great diſturbance in them: by which means the fleſhy fibres being bloated and contracted by the ſpirits that are irritated, and driven to diſcharge themſelves, are ſet upon expulſive contractions in order to caſt forth that which is offenſive to them. Hence it is, that when the upper part of the Guts is provoked to more frequent and ſtrong vermiculations [or Worm-like motions] whereby to thruſt the matter contained in them forward, the expulſive motion being begun there, is propagated to the other Guts, and then being ſtimulated, or provoked by the matter contained in the uppermoſt, which is thruſt down into them, are put all along into expulſive contractions, till the excrement that is outermoſt be voided, whileſt there is ſtill more and more comes into the room of it. The purging Tincture, as it is offenſive to the Spirits, puts the nervous fibres upon ſhrivelling themſelves, and cauſes very often moſt painful extenſions, provoking the fleſhy fibres alſo to expulſive contractions, as I have ſhewn: then for as much as it fermenteth with the Humours and matter contained in the Guts, it makes an ebullition or bubling in the cavities thereof, creates wind therein, and variouſly bloateth and diſtendeth the containing membranes, and conſequently produces evacuations of the belly, with gripes, or breaking of wind.

The operation of Purges in the Duodenum and the ſmall Guts.

Whileſt the nervous and fleſhy fibres are thus provoked, through the ſpirits being irritated by the purging Tincture, to offenſive ſenſations, and expulſive contractions; the paſſage alſo of the Gall and Sweetbread juice being twinged and ſhockt, pour forth their humours, ſpewing them as it were into the cavities of the Guts: by both of which, and eſpecially by the Gall, if it flow too copiouſly, the membranes being vellicated or twinged as much as by the Medicin it ſelf, are urged to more frequent and greater expulſions; and therefore when the excrements are died with the yellowneſs of that humour, it is commonly (though falſly ſaid) that the Gall is drawn forth, and that peculiarly by ſuch a medicin: but if the humours that flow out of thoſe paſſages do mutually boyl up, and, as ſome think, ſtruggle with each other very furiouſly, then there

How they work upon the Gall and Sweetbread juice.

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there will be in the cavities of the Guts, a ſtill greater diſturbance, with a ſwelling of the humours and wind.

And how upon the Glandules and mouths of the Arteries.

Nor are the Gall and Sweetbread juice onely ſqueezed, or preſſed by the Purge into the paſſages of the Guts, but alſo there are ſerous humours (milked as it were out of the Glandules of the inner coat, that are bound up by being twinged, and likewiſe out of the mouths of the Arteries, which are rubbed againſt and opened) which more dilute or waſh down the matter contained in the Belly, and not only by lubricating, but by irritating promote evacuation. But the very ſlime of the Guts that ſmears over the hairy veil, if it be waſhed off by ſuch ſerous humours, and be wiped clean away by reaſon that the nervous fibres are ſhrivelled and ſhockt, is an addition to the excrements, and increaſeth their bulk. Yea, ſometimes when this ſlime is very much wiped away, and the mouths of the veſſels are thereby much twinged, and as it were ſhaven, pure bloud comes forth and cauſes gory Stools.

Thus do Purging Medicins operate in the cavities of the Stomach and Guts, in as much as they provoke the ſpirits and ferment with the humours. But from what particles or ingredients of the Medicin this irritative or provoking, and likewiſe the fermenting quality proceeds, we ſhall by and by inquire; in the mean time I obſerve, that the operation of a purging Medicin reaches far beyond the firſt paſſages, to wit, into the maſs of bloud, the nervous liquor, and conſequently into the brain, heart, and other parts or bowels.

How Purges work upon the Bloud: and alſo upon the whole habit of the Body.

1. As to the Bloud, it is manifeſt that the particles purging Medicins are received into the maſs of it, and circulate [or go round the body] with it, from this, that the Urine borrows its ſmell and colour from ſome of them. The Milk of a Nurſe that hath taken Phyſick, purgeth the Child. Some Medicins evacuate the Water of thoſe that are troubled with a Dropſie by Stool. *Reſin of Jalap* uſes to purge forth a Lieiſh Serum that ſmells like piſs. Moreover from the common obſervation of both the Ancient and Modern Phyſicians, a Purge that is opportunely given in the declenſion of a Fever, draws forth the feveriſh matter that was before ripened and apt to come away. Wherefore I make no queſtion, but that ſome particles of the purging Medicin are admitted into the Bloud, and diffuſed through its whole body or maſs. And indeed we need not trouble our ſelves to make any long enquiry about the paſſages at which it enters, for of neceſſity ſome particles of the purging Medicin being mixt with the nutritive juice, muſt creep in at the milky veſſels. Moreover ſince there is a thick Wood as it were of Veins, inſerted or planted in the inner coat of all thoſe Bowels where concoction is performed, it will be natural enough to conceive, that ſome parts of a Medicin as well as of the Food, may be carried through theſe paſſages into the Bloud; and being diffuſed in great quantity, firſt into the Veins, and then into the Arteries (if they are altogether heterogeneous [or of a contrary nature] and untamable) diſturb the maſs of Bloud, toſs it to and fro, and provoke the exoneration or excluſion of themſelves as well as that of the Blouds dregs: but the Bloud being ſo diſturbed, and put into an expulſive fermentation, diſchargeth the particles of the Medicin together with other recrements or dregs that are to be thrown out through the mouths of the Arteries belonging to the Guts (which at that time are likewiſe twinged and opened by the Medicin) into the cavities of thoſe Entrals, in order to their immediate evacuation. In this manner the ſerous or wheyiſh excrements and corruptions or ſuperfluities of the Bloud are purged out of its maſs, together with the purging Tincture that is remanded [or ſent back] into the Guts. Moreover when the bloud veſſels begin by this means to be emptied, then other ſuperfluous or dreggy humours, that were ſetled about the Bowels, Heart, Brain, or habit of the Body, are again ſucked into the maſs of Bloud, and being drawn immediately (whileſt the expulſive fury of it yet remains) toward the Guts, are caſt forth any way that is then open; by which means purging Medicins work upon the whole Body, and draw forth incongruous and noiſom matter from all parts, be they never ſo remote.

Three degrees of Purging by Medicin.

As therefore I formerly obſerved that there were three degrees of a Lask proceeding from Humours, or a natural Purge; ſo I thought fit at preſent to make as many kinds or ranks of Purges that are cauſed by Medicin. The firſt of them I take to be when by reaſon that the nervous fibres of the Guts are gently irritated, the fleſhy ones being contracted beyond their uſual rate a little faſter and ſhronger, thruſt forward all the looſer matter that is in them more ſwiftly from one part to another, till at laſt they kindly caſt it forth. In the ſecond ſort of Purgation, ſome other Humours that are preſſed out of the Gall paſſage, the Sweetbread paſſage, and mouths of the veſſels which are vellicated by the Medicin, are voided together with the excrements of the belly. In the third, not onely theſe paſſages being more vehemently provoked, do pour forth a greater quantity of Humours of all kinds into the cavities of the Guts, but alſo there

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is a recrementitious sort of matter that is brought by the Arteries out of the Bloud (which is dissolved and precipitated by the particles of the Medicin that are admitted into it) and by consequence also out of the nervous juice and other parts, into the Guts, through which it is evacuated. *Phar. Rat.* Part I.

Hence I think it is very manifest, that Purging is performed onely by irritation, fermentation, and expulsion, and not (as the Vulgar suppose) by attraction. Nor ought any Philosopher or other, that pretends to give the reason of things, or to use his own, to assert, that any Medicins through the similitude or likeness of their substance, or by reason of any (I cannot tell what) specifick qualities, act upon any particular and determinate humour, so as to purge that forth peculiarly by it self. But whereas sometimes Gall, Phlegm, Serum [or Whey,] or Melancholy [black choler] is supposed to be separated and discharged apart from any other, that seems to be, either because the Medicins provoke the Entrals in a different manner, or that they ferment divers ways with the Bloud and other Humours: or lastly, that they give a tincture or die to the very excrement it self. And it will be worth our while to give some reasons and instances for each of these cases. *Purges do not work by attraction or specifick qualities, &c.*

First therefore Medicins, according as they contain particles that are more volatile or fixed, gentle or sharp, smooth or rough, do variously irritate or provoke the Bowels, and consequently cause expulsive contractions either weaker, or stronger, and sometimes in one place sometimes in another, sooner and with more force. For example, Roses, Violets, Cassia, Manna, and other the like, that are compounded of subtle and thin parts, most commonly disturb not the Stomach at all; but when they are got over the *Pylorus* they begin to irritate the nervous coat of the *Duodenum*, which is more exquisitely sensible, and before they go any farther, spend almost all their force there; and by that means the passage of the Gall being shockt through the vellication or twinging and shrivelling of that coat, the excrements are mixt with Gall when we void them. On the other hand other Medicins, as Gum Ammoniack, Opopanax, Sagapenum, Turbith, and the like, that consist of a thicker and more viscous matter and particles more obtuse or dull, are not so ready in their operations, as presently to provoke the parts, but when they are dissolved in the Stomach, and from thence got into the Guts, begin their vellications or twingings, not on a sudden, but when they are advanced some space, and have stuck for some time to their coats, and that below the passage of Gall: whereupon, besides the common excrements and some serous humours that are squeezed out of the mouths of the Vessels, they shave and wipe off the slime that covers the Guts, and thereby cause Stools that are seemingly petuitous or phlegmatick. *The differences of Purging operations.* *1. From their different irritations in the Bowels.*

2. In as much as Medicins, being indued with particles of several kinds, do variously ferment with the Bloud and other juices, they cause evacuations sometimes of serous, sometimes of cholerick, or other kinds of Humours. For some, as Aloes especially, and Rhubarb, because they contain in them particles of matter that is, as it were, adust, beget such like particles in the Bloud; so also they excite the adust dregs thereof to motion, and force them more plentifully into the choler passages: so that when by this means the choler is more copiously gathered together, and flows out of its receptacles into the Guts, the excrements become more cholerick. I have known some that by drinking raw, plain Milk, to the quantity of two pints, have usually been purged, and voided excrements altogether yellow: The reason of which is, that the Milk it self turned to choler, as by bitter Belches and heat of the Bloud, which was presently caused (as if the Gall swelled up) I might reasonably conclude. Moreover other purging Medicins, as *Jalap*, *Colocynthis*, *Elaterium*, and some Preparations of Mercury, consist of sharp particles, which are often corruptive, and being admitted into the Guts, and thence transmitted into the Bloud, do notably dissolve the mass thereof, and precipitate it very strongly into a serous or wheyish constitution; yea, sometimes they do as it were invenom it, and corrupt the temper of it. Then, if at the same time that the Bloud is so dissolved, there be a vellication in the Guts, the serous dregs of the Bloud, with its corruptions and meltings, are spewed out of the mouths of the Arteries, that are there opened, into the cavities of the Bowels, and by that means our Stools are very wateriſh. But if, after the Bloud is so melted, as it were, by the Medicin, and injured in its temper, a man hath but few Stools, the Bloud becomes still more depraved by that incongruous and corruptive mixture, and thereby gains a notable ill temperament; or else by distributing its dregs and corruptions into the habit of the Body, makes pustles and watery bladders break out in the Skin. For so, by the unskilful use of Physick oftentimes great evils do ensue. Nor is it for nothing that the vulgar are so afraid, if at any time a Medicin doth not work as they expect, lest the virulence thereby contracted and left in the body, after it hath lain there a considera- *2. As they variously ferment with the Bloud.* *The Ills that follow from strong Purges.*

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ble time, may at last produce bad effects: for from such an occasion sometimes Leprosies, as it were, arise. Not long ago, a purging Powder (and as I supposed, Mercurial too) was given to a certain persons two sons at *Oxford*, by an Emperick or Quack; whereof the one was purged for the space of 24 hours an hundred times at least, with gripes and great fainting of his spirits; whilest in the mean time the other, who was something the elder, had never a Stool; but in a few days his hair came off, his nails grew black, and in a short time after watery Pushes broke out all over his Body, which being hardened into one continued scabby scurff, fell away, and immediately new ones arose in the room of them: which Distemper, through the extraordinary viciousness of the temper of his bloud, which was as it were poisoned, being altogether incurable, tormented the poor Youth most grievously for above two years before he could be perfectly cured. Nor is the mass of Bloud depraved by Mercurial Medicins onely, but sometimes also by other Purges, taken from the Family of Vegetables, in so much that it cannot be restored, or renew under a long time. So that it is not without cause that *Helmont* complains and says, that purging Physick doth not always or onely draw forth Humours that are in the Body, but also by its corrupting qualities depraves them.

A notable example of it.

Whence came the errour of elective Purge.

3. The errour of elective Purging hath taken root yet deeper, from this, that Liquids which are voided through the belly (being they borrow sometimes their colour from the Medicin, are falsly believed, because they are cholerick or melancholick before hand, to be educed or drawn forth apart from other humours. Nothing is more usual, than for Urine and Siege too to be died yellow by *Rhubarb*, *Aloes*, Roots of *Termerick*, and some other Medicins that People take: so also the Infusion of *Senna*, and purging Medicins that have Chalybeate or Vitriolick ingredients in them, make the excrements which they evacuate, look black. Moreover a different constitution of Body, and temperature of the humours, produces divers appearances in the excrements. For since in some the choler Vessels swell with the humour they contain, and in others vitriolick Salts which are the Parents of that black tincture settle in the first passages, whilest some again by reason of their ill diet, have abundance of serous matter gathered in their whole Body, it therefore makes People think, that when such Stools follow upon the taking of such or such a Medicin (if it happens that one sort of Humours are purged by that which they commonly call a *Cholagogon* [or Gall-purger] and another sort by a *Melanogogon* [black Choler-purger] and so another by an *Hydragogon* [or Water-purger] that such Humours are purged by such a Medicin electively [or as it were out of choice.] Wherefore as to the choice of purging Medicins, although those classes or peculiar sorts of Medicins appropriated to this or that juice, do not at all please me; yet I think that all Purges are not to be used indifferently in all cases; but on the contrary, you must take the advice of a good Physician, who can tell how to distinguish between them, and according to the strength of the Patients, their temperament, the strength, and constitution of the Bowels, their ability, custom in Diet, and imagination, yea, and according to the nature of the Distemper, as also the time and condition of it, may apply a weaker or a stronger Purge, of hot or temperate, gentle or sharp, solid or liquid, or any other kind of Medicins.

Purging not needful to prepare the Humours.

The ancient Physicians, to whom also the Modern ones, (a great many of them) assent, affirmed not onely Purging to be elective, but also that a preparation of the Humours was previous, and as it were necessary to it: Wherefore in their practical Books, where-ever Purging is prescribed, you have very formally and pompously, as it were, a long Bedrol of Preparatives designed for such and such Humours; the use whereof, although it seems very plausible, yet is, methinks by no means advantagious; because indeed there are no such humours in nature, as I have elsewhere clearly shewn. But seeing Purges are not convenient at all times, nor in every constitution of the Body, for the right performing thereof there is required both opportunity and some sort of preparation too; both of which respect or concern not onely the first passages, but the mass of Bloud.

What Preparation is required for Purging,

1. In respect of the Stomach.

As to the first, If at any time the Stomach is oppressed with a load of slimy phlegm, or troubled with a boyling of the Gall when it swells, it is oftentimes in vain or irregular to purge, unless the matter contained therein be first cleansed away by a Vomit, or that their oppression and heat be taken off by Digestives.

2. In respect of the Bloud.

But as to the Bloud, many times a Purge is unseasonable, and sometimes also incongruous; and in neither of these cases do Preparatives, but onely things that alter it, agree: for those imaginary Humours are not to be disposed for evacuation, but the bloud it self ought to be reduced, either from a troubled and confused state to a calm; or from weakness or ill temper to strength and an even constitution. Whilest the Bloud, as it boyls in a Fever, is disturbed in its mixture, Purging is always found

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to be hurtful; and therefore it is condemned by *Hippocrates* and the Ancients: So also whileſt the maſs of it, being languid and weak, doth not riſe to a due ferment; all ſuch Medicins are forbidden. Moreover when the Bloud is exceſſively full of Choler or Water, or is inclined too much to coagulations or diſſolutions, Purges for the moſt part do not remove ſuch defects or depravations of it, but oftentimes increaſe them. But rather in ſuch caſes Medicins that alter the Bloud are proper; that is, ſuch as may deſtroy the hurtful ſeparations or combinations of Salts, Sulphur, or Serum, and remove all other their enormities. Of which Medicins for purging, whether previous[or preparative] or (which moſt commonly are the better of the two) ſuch as ſupply the place of a Purge, to wit, digeſting and altering Phyſick, I ſhall ſpeak hereafter in particular. *Phar. Rat.* Part. I.

Concerning the Theory or ſpeculation of purging Phyſick, I ſhall not ſay much more; unleſs it be, that ſeeing (as is manifeſt from what I have already told you) that Purges not onely provoke the ſpirits that reſide in the fibres of the Bowels (ſome of them) to reſent the trouble given them, and (conſequently others) to contract themſelves into expulſive motions, but alſo ferment the Humours and the Bloud, compelling them into various diſſolutions and ſeparations of the parts; it remains that we enquire, upon what ſort of particles, whether Elementary or Secondary, and (if I may ſo ſay) qualitative particles, both thoſe qualities (as well the irritating as the fermenting quality) depend. Hereupon in general I have obſerved what ſhall hereafter be confirmed by inſtances, to wit, that the irritating quality which is uſually exerted in the Bowels, and by the inſtinct whereof the purging contractions are cauſed, proceeds in no wiſe from the principles or particles of the Medicin, whether ſpirituous, watery, or earthy, no nor from the Salt or Sulphureous ones alone, but from them always joined together, and ſometimes alſo when joined with others. For though that Salt and Sulphur are the chief inſtruments of purging Irritation, yet neither of them by it ſelf uſes to be ſo offenſive to the Bowels as to excite the motive fibres into expulſive contractions; but when they are joined together, they exalt and ſharpen each other; yea, they put our Bodies into a temperature which is very hurtful and never to be reduced. The tincture of Antimony, as likewiſe the Ceruſs of it, give no offence to the Stomach, but are rather grateful and cordial. But *Crocus Metallorum, Stibium,* Butter of Antimony, and other things prepared out of Sulphur and Salt mixt together, are exceſſive ſtrong Vomits or Purges. In like manner I have elſewhere obſerved, that ſulphureous and ſaline particles, when ſeparated from each other and alone are grateful enough both to the ſmelling and the taſte, but when they are intimately mixed with each other, gain preſently a ſtink, or ranck rotten ſmell.

The virtue of a Purge is either irritating or fermenting.

upon what particles both of them depend.

1. The irritating quality.

But now as to the purging Fermentation, it doth not ſo plainly appear, whether the ſame particles that provoke the ſpirits to expulſive contractions, do alſo diſſolve the Bloud and make it ſeparate into ſeveral parts, ſo as to pour out the dregs of it through the mouths of the Arteries into the cavities of the Bowels. Indeed the Bloud, like Milk, is uſually diſſolved and precipitated into ſerous Humours, moſt commonly by Acids onely, as I ſhall by Experiments and Reaſons hereafter plainly demonſtrate. Alchali Salts, fixed and volatile, yea, and nitrous too, do not at all diſſolve the mixture of the Bloud, but rather keep it entire, and reſtore it when diſſolved; ſo likewiſe doth Spirit of Wine, and other things that are purely ſulphureous; but ſo far are Acids from promoting purgation, that nothing doth more infringe, or weaken, and totally take off the purging quality of Medicins.

Upon what particles the fermenting quality depends.

That therefore we may make a judgment concerning Purges by ſenſe, I think it probable, that they (being endued with a taſte that is moſt commonly ſharp, and ſomewhat poignant) together with Sulphur, are impregnated with a kind of volatile and ſharp Salt, which in the ſtronger ſort of them, is in ſome meaſure putrefactive; and that ſuch particles in them, which are ſulphureoſaline, do not diſſolve the Bloud like Acids, or other precipitating Salts, that is to ſay, by embracing ſome parts of it, more intimately and cloſely, and ſo ſeparating them from their aſſociates, to oblige them to become their own companions; but on the contrary, the purging particles, being diſagreeable to the whole maſs of Bloud and all its particles, as alſo immiſcible [or not mingleable with it] and untameable, put them all into confuſion like themſelves, and excite them to an expurgative effervеſcence [or boyling up]; which by the immediate aſſiſtance of the pulſe of the heart, growing quicker, is not allayed or cooled before all heterogeneous parts are thrown out, together with ſome portion of the ſerous Humour wherewith they are mingled, and ſometimes alſo other dregs of the Bloud too.

The maſs of Bloud being impregnated with the particles of a ſtronger ſort of Purge boyls up at the ſame rate, as generous Wines, when other ſorts are thrown

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into the ſame Veſſel, are ſaid to ferment anew to expel that which is diſagreeable to their body; and therefore ſometimes they continue to bubble up in the Fat, till either the Veſſel breaks, or their temper be quite vitiated. But this doth not happen ſo frequently to the Bloud, becauſe not onely the incongruous particles of the Purge are thrown out of the Arteries (which are open in all parts, but eſpecially ſomewhat more apparently into the cavities of the Guts) but alſo the other parts of the Bloud it ſelf, which are vitiated and ſeparated, are eaſily evacuated. Although purging Medicins too ſometimes, if they are too violent, do much pervert the temper of the bloud, and as it were poiſon it. For indeed ſome of them that plainly corrupt the bloud, work by way of Lask, juſt as Cantharides do by Urine; that is, they in ſome meaſure melt and corrupt the maſs of it, and then thoſe melted parts of it together with the rejected particles of the Medicin, do by their ſharpneſs very much provoke, or many times corrode the parts that they paſs through. Wherefore let thoſe that deſire health or long life, avoid all Quacks that uſe hardly any thing but Mercurial and ſtrong Medicins, more than they would a mad Dog or a Serpent.

CHAP. II.

The ſeveral ſorts of Purges, with the Receipts and Reaſons of ſome Compoſitions.

Scarce any Purges made of Minerals, though Vomits and Sweating Medicins are.

MInerals do not much contribute to the number of things that are purging, though the beſt Vomits and Sweating Medicins are taken chiefly out of that Store-houſe: but purging Medicins, being of a midling and a different operation, cannot be formed out of thoſe impure and harder ſubſtances. For if the purging quality, though never ſo correct, be in any meaſure left as a Spur, in the mixt body, whatever irritation proceeds thence in the Stomach, will prove a Vomit; but if that quality be totally removed, then there will be no evacuation cauſed in the Bowels, but through the virtue of ſome Reliques of the *Sal Alchali*, all the operation will end in Sweat.

The reaſon of that difference.

For vomiting Medicins ſeem to be ſuch, as being not by any means to be ſubdued and tamed in the Stomach, but impregnated with ſharp, and as it were, pointed particles (that is to ſay, Sulphureoſaline ones) provoke it to violent, expulſive contractions, to the end that they may be thence exterminated, or diſcharged by the ſhorteſt paſſage, which is immediately by Vomiting: on the contrary, Sweating Medicins though they cannot be ſubdued and tamed, yet if their ſharpneſs be taken off, and their particles broken into round bits, as it were, which have no edge, they do not at all provoke the Stomach, but paſſing into the maſs of bloud, ferment it (as being unmingleable and untameable) and put it into an univerſal heat, whereby they make way for themſelves to evaporate along with the ſerous Liquor and other dregs of the bloud. But Purges being endued with particles that are incongruous, more dull, and weak, do not either immediately or vehemently irritate the fibres of the Stomach; but when they are got ſomewhat deeper into them, they firſt cauſe an offenſive perception, and then, that they may caſt forth what is troubleſom without any great diſturbance, they increaſe and multiply the uſual expulſive and ordinary motions, that is to ſay, through the paſſages of the Guts.

Some Purges are taken from Minerals, but are improperly ſo called.

But ſome purging Medicins are taken out of Minerals, as *Mercurius Dulcis*, *Lapis Lazulus*, *Armenus*, and ſome other, which for all that, are improperly ſo called, for they are very uncertain in their operation, in ſo much that they are ſeldom uſed for that end by themſelves, though with other purging Ingredients they are given very ſucceſsfully.

Purges are taken moſt from Vegetables, and are of various ſorts.

But when we come to Vegetables, here we enter into a Field that is broad, and largely planted with things that are purgative: which ſince they are of many ſorts, are uſed to be recounted and diſtributed in ſeveral manner; that is to ſay, into the more gentle ſort, the middling ſort, and the ſtronger; ſo alſo into Gall-Purgers [*Cholagoga*] Melancholy-Purgers [*Melanogoga*] Phlegm-Purgers [*Phlegmagoga*] and Water-Purgers [*Hydragoga*]: and furthermore, into Excoproticks [or Dung-Purgers] Minoratives [or leſſeners] and Eradicatives, [or rooters out of any Humour.] I need not inſiſt upon each of theſe diviſions, but will reduce all Purges to three kind onely; that is, in the firſt place I will give you, ſuch as make no great irritation in the bowels, and cauſe in the bloud and humours no more than a gentle fermentation: of which ſort are *Violets*, *Caſſia*, *Tamarinds*, *Roſes*, *Rhubarb*, *Senna*, *Myrobalans*, *Epithymum* or *Dod-*

Tqe ſorts of Purging Vegetables.

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der, Carthamus or *Wild Saffron, Agarick, Aloes* and the like. Secondly, Such as create not onely a twinging in the Bowels, but alſo a ſomething ſtronger effervеſcence [or boyling] in the humours; in ſo much in theſe latter great diſturbances, and thoſe ſometimes feveriſh ones too, are raiſed; and in the former, [to wit, the Bowels] contractions, and gripes, though not very intolerable, are excited: in which rank there are placed *Scammony, Turbith, Hermodactyls, Mechoaca, Jalap, Ebulus* or *Dwarff-Elder*, or *Wallwort, Elder, Opopanax, Sagapenum.* In the laſt place I ſhall ſhew you ſuch as vellicate or twinge and lance, as it were, the Stomach and Guts extremely; yea, ſuch as very much diſorder the bloud and other humours with a kind of putrefactive quality, melting as it were, and diſſolving the mixture of it. Such are *Hellebore, Elaterium, Soldanella* or *Bind-weed, Euphorbium, Eſula* or *Spurge, Coloquintida*, &c.

Purging Vegetables do not need much chymical Preparation.

Vegetables do not always need, as Minerals do, any long preparation to open their compoſition; for they oftentimes whileſt their mixture is entire (quite contrary to what I have obſerved concerning Minerals) work the more ſtrongly. For ſuch things whoſe virtue conſiſts in a ſubtle and fugitive compoſition, ought not to be reduced into Extracts, Magiſteries, or Quint-Eſſences by any great chymical trials or preparations: but many of them, as *Rhubarb, Manna, Caſſia, Senna, Myrabolans*, &c. being reduced into Pills or Powder, or infuſed or boyled in a convenient liquor, work not onely better but more eaſily too; which, if they be tortured with too much artifice, either totally loſe their purgative quality, or exert it very ſlowly and with ſome reluctancy. It hath been uſual to draw forth the tinctures of Vegetables by impregnating the liquor, into which they are infuſed, with Salts of Tartar or Wormwood; for by that means it quickly gains a deeper colour. Although I do not diſapprove of this method, in as much as the fixed Salts of Herbs boyl up with the acid juices of the Stomach and Guts; yet I may lawfully diſcover the cheat that lies hid in it, for the Salts do not draw forth that full Tincture, but onely make it appear. For if you put the Salt of Tartar into an Infuſion of *Rhubarb, Senna*, or any other vegetable, which is already made and ſtrained, immediately the tincture or colour of it will become deeper: the reaſon of which is, becauſe the Salt-fixed particles, being very obtuſe or blunt, ſtop the pores of the Liquor, in ſo much that the rays of light are very much refracted in their paſſage: wherefore any tincture, which is made deeper by the Salt of Tartar, will become preſently more clear and thin, by pouring into it the ſpirit of Vitriol, whoſe particles are ſharp, without the precipitation of any matter at all.

Some of them are bettered by extraction.

What Salt of Tartar contributes to the extracting of a Purging tincture.

But yet among vegetable Purgers, ſome are mended by Chymical preparation; for in thoſe that are filled with Salt and Sulphur, in which active and kind particles can be ſeparated from the more dull and hurtful ones, and be reduced into reſinous, or otherwiſe compendious extracts, no queſtion, but the reſolution and new compoſition of them may be performed with good ſucceſs. Wherefore, when we would rightly prepare ſome ſorts of Purges, we extract with ſpirit of Wine, the ſulphureous part, and ſomething of the ſaline too, as in the reſinous magiſteries of *Jalap, Scammony, Mechoaca*, &c. For others we uſe ſaline menſtruums [or Liquors to diſſolve them,] to wit, diſtilled Vinegar, or Waters ſharpened with ſpirit of Vitriol, or Salt of Tartar, and that in a double reſpect; that is, either that the Medicin may be compoſed in a leſs bulk and a neater form, through the ſeparation of the active particles from the earthy matter; or that all the vehement or virulent qualities of the mixed body, may be drawn out or tamed.

It would be an infinite pains and trouble to me particularly to relate in this place all the ſimple Purges, with their Preparations, Diſpenſations, and Doſes: but it is ſufficient for my purpoſe, ſince the principal compoſitions of Purging Medicins are Potions, Powders, Boluſes, Morſels or Tablets, and Drinks or Infuſions in Wine; to lay down ſome choice Receipts of each, and thoſe of a threefold nature; according as the operation of the Medicin ought to be, gentle, middling, or ſtrong; to which I ſhall add, in the fourth place, the Receipts of purging Medicins that are eaſily had, for the benefit of the Poor.

The chief Receipts for Purges.

1. Gentle Potions.

Take of Rhubarb ſhreded ℥ iij. of Citron-coloured Santalum [or Sanders] ʒ ß. of Salt of Tartar ℈ j. infuſe it cold all night in water of Cichory, and of white Wine ℥ ij. ß. of the clear ſtraining ℥ iij. add to theſe of Syrup of Cichory with Rhubarb ʒ ß. of Cinamon water ʒ ij. make a Potion. Gentle Potions.

2. Mid-

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2. Middling Potions.

Middling ones. *Take of the beſt Senna ℥ iij. of Rhubarb, Agarick trochiſed, of each ℥ j. ß. of Citron-coloured Santalum ℈ ij. of Salt of Tartar ʒ ß. of Coriander ſeeds ʒ j. infuſe it cloſe and hot ℥ iij. of white Wine and as much Fountain water, all night; of the ſtraining thereof ℥ iv. add to it of the Syrup of Citron or Oranges ℥ j. of aqua mirabilis ʒ ij. make a Potion.* Or, *Take of the Decoction of Senna Gereon ℥ iv. of Syrup of Roſes diſſolved ℥ j. of Cream of Tartar ʒ ß. of Cinnamon water ʒ ij. Make a Potion.*

Take of the beſt Senna, of Caſſia Fiſtula, and Tamarinds, of each ℥ ß. of Coriander Seeds ʒ ij. boyl in Fountain water ℥ x. of it, till the third part be conſumed of the ſtraining clarified with the white of an egg, adding of the Syrup of Citron or Oranges ℥ j. Make a Potion.

3. Strong ones.

Strong ones. *Take of the Decoction of Senna of Gereon (with the addition of the fibres of black Hellebore, and Agarick, of each ʒ j. ß.) ℥ vj. of Syrup of Roſes diſſolved, or of Orange flowers ℥ j. of aqua mirabilis ʒ ij.* Or,

Take of the beſt Senna ℥ ß. of the fibres of black Hellebore, of Turbith, of each ʒ ij. of Citron-coloured Sanders ʒ j. of Coriander ſeeds ʒ j. ß. of Salt of Tartar ʒ ß. make a cloſe and hot infuſion in ℥ viij. of white Wine all night, of the clear ſtraining ℥ v. add to it of Electuary out of the juice of Roſes ʒ iij. Syrup of the Purging Thorn ʒ vj. of Cinnamon water ʒ ij. Make a Potion.

4. Potions that are eaſily had for the benefit of the Poor.

Take of Purging Flax one handful, of the ſeeds of ſweet Fennel ʒ ij. boyl them in Spring water, as much as is ſufficient, to ℥ vj. add of white Wine ℥ ij. Make a Potion. In the ſame manner you may make a draught, to purge you, of the flowers of red Damask Roſes; as alſo of the leaves of the Orange Tree, and of the Roots of Eupatorium of Avicenna.

II. Pills. Firſt of a more eaſie operation.

2. Gentle Pills. *Take of Stomach Pills with Gum ℈ j. to ʒ ß. of Tartar Vitriolized* gr. ij. *of Balſam of Peru as much as is convenient, make* iij. *or* iv. *Pills. You may make them in the ſame manner from a maſs of Pill Ruffi, Maſtich of Amber, or ſweet Gum, and alſo of my Extract diſſolved, the deſcription whereof you may ſee in my Treatiſe of the Scurvy.*

2. Middling ones.

Middling ones. *Take of Stomach Pills with Gum ʒ ß. Roſin of Jalap* gr. iv. *to* x. *of Tartar vitriolated* gr. vj. *of Ammoniack diſſolved a convenient quantity, and make* iv. *Pills. In like manner you may make them out of a maſs of Pills of Succinum, Tartarized according to Quercetan. So alſo in the room of Roſin of Jalap put of Scammony ſulphurized* gr. vj. *to* xij. *or Roſin of Scammony* gr. viij. *to* xiv. Or, *Take of Stomach Pills with Gum, of each ℈ j. of Roſin of Jalap* gr. vj. *to* xij. *of Balſom of Peru, a convenient quantity, and make* iv. *Pills.*

3. The ſtronger.

Strong ones. *Take of Pill Rudy ʒ ß. Roſin of Jalap* gr. viij. *to* xij. *of Balſom of Peru a convenient quantity, and make* iv. *Pills to be taken according to order. In like manner you may prepare them out of a maſs of Pill Cochy of Sagapenum. Take of the Pill of two ingredients ℈ j. to ʒ ß. of Calamelas ℈ j. make* iv. *Pills, to be taken according to order.*

4. Thoſe that are eaſie to be got, and of a leſs price.

Thoſe that are eaſie to be had, of a leſs price. *Take of the Powder of choice Jalap ʒ ij. of Diagridium ʒ j. of Cloves Ginger, of each ℈ j. of Ammoniack diſſolved a convenient quantity, and make a maſs. The Doſe is ʒ ß. Take of Pill Cochy ʒ ß. to ℈ ij. and make* iv. *Pills.*

III. Pow-

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III. Powders. First Gentle ones.

Gentle Powders.

Take of Rhubarb pulverized ʒβ. *of Salt of Wormwood* ϑ β. *of Cloves* gr. ij. *make a Powder and give it in a spoonful of clear Cinnamon Water, or in a draught of Ale.*

Take of the Powder of Senna major compound. ʒ β. *to* ʒ j. *give it in a draught of Posset drink.*

Take of the Powder of the leaves of Senna ϑ j. *of Calamelas,* gr. xvij. *of Citron-coloured Sanders* ϑ β. *make a Powder, and give it in a Spoonful of Panada.*

2. Middling ones.

Middling ones.

Take of the Powder of Diasenna ʒ j. *of Cream of Tartar* ϑ j. *make a Powder, and give it in a draught of Ale.*

Take of the Rosin of Jalap gr. x. *of Calamelas* ϑ j. *of Cloves* gr. vj. *make a Powder, and take it the same way.*

Take of the species of Diaturbith with Rhubarb ʒβ. *to* ʒ j. *of Cream of Tartar* ϑ j. *to* ʒβ.

3. Strong ones.

Strong ones.

Take of Turbith and Hermodactyls of each ʒ iij. *of Diagridium* ʒ j. *of Ginger* ϑ j. *make a Powder. The Dose is* ʒ ß. *to* ʒ j.

Take of the Powder of Cornachinus [a Mans Name] ʒ j. *give the Powder of Hermodactyls compounded, the same way; as likewise the Hydrotick, or Water-purging Powder of Riverius.*

4. Such as are cheap and easily gotten.

Cheap ones.

Take of the Powder of the Roots of choice Jalap ʒ j. *of Ginger* ϑ j. *Give it in a draught of White Wine. So likewise of the Powder of the Roots of Mechoaca, as also of the Leaves of Senna to* ʒ j. *Take it in any Liquor.*

IV. Boluses and Electuaries. First, Such as work gently.

Gentle Boluses and Electuaries.

Take of Lenitive Electuary ℥ ß. *of Cream of Tartar* ʒß. *of Syrup of Roses a convenient quantity: make a Bolus. Take of fresh Cassia* ℥ß. *of the Powder of Rhubarb* ʒ ß. *of Cream of Tartar* ϑ j. *of Syrup of Roses as much as suffices, and make a Bolus.*

2. Middling ones.

Middling ones.

Take of Lenitive Electuary ℥ ß. *of Cream of Tartar* ʒ ß. *of Rosin of Jalap* gr. vj. *of Syrup of Roses a convenient quantity, and make a Bolus.*

Take of Electuarium Diaphœnicum ℥ ß. *of Powder of Hermodactyls comp.* ʒ ß. *of Syrup of Elder a convenient quantity, and make a Bolus.*

3. Strong ones.

Strong ones.

Take of Electuary of the juice of Roses ℥ß. *of Rosin of Jalap* gr. x. *of Cream of Tartar* ʒ ß. *Syrup of Elder a convenient quantity, and make a Bolus.*

Electuaries are compounded of the same ingredients in a greater quantity, adding thereto Conserves of Damask Roses, or Peach Flowers: the Dosis being the quantity of a Chesnut, to be taken every day early in the morning, or twice or thrice in a Week.

4. Boluses and Electuaries that are easily had.

Such as are easily had.

Take of Powder of the Roots of Jalap ℥ j. *of Mechoaca* ℥ ß. *of Ginger* ʒ ij. *of Cloves* ʒ j.

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of Cream of Tartar ʒ iij. *of Salt of Wormwood* ʒ j. *of Sugar* ʒ ij. *of Syrup of Roſes diſſolved, a convenient quantity, and make an Electuary. The Doſe is the quantity of a Wallnut.*

The looſening Medicin called *Confectio Solutiva*, and that made of looſening Raiſins, as alſo the *Diaprunum* [or Medicin made of Prunes] by *Sylvius*, are to be found in *Praxis Medica, p.* 30.

V. Morſels or Tablets of indifferent operation.

Morſels or Tablets.

Take of the Powder of Mechoaca, and of Gummy Turbith, of each ʒ ß. *of Scammony ſulphurated* ʒ ij. *of Roſin of Jalap* ʒ j. *of yellow Sanders* ʒ j. *of Cream of Tartar* ʒ ij. *of Conſerve of Violets* ʒ j. *of Sugar diſſolved in Roſe water, and baked into Tablets* ℔ j. *according to Art; let the weight of each Tablet be* ʒ j. *The Doſe* i. *or* ij. *purging Tablets: in* Sylvius Praxis Medica, p.28.

VI. Infuſions in Wine and Ale, or the like, or gentle Purgers.

Infuſions in wine and Ale, &c.

Take of the Leaves of Senna ʒ j. ß. *of Turbith and Mechoaca, of each* ʒ vj. *of the fibres of black Hellebore* ʒ iij. *of Cubebs, of the Roots of Gallingal, and of ſharp Cinamon, of each* ʒ ij. *put them in a large Glaſs with four Pints of Rheniſh Wine, and of Salt of Tartar* ʒ j. ß. *Let them ſtand cold and cloſe ſix days, then put to them of white Sugar* ʒ iij. *and ſtrain them through* Hippocrates's *ſleeve. The Doſe is* ʒ iij. *or* iv.

Take of the Leaves of Senna ʒ iij. *of the Roots of Polypody of the Oak, or Oak Fern, of Sharp Dock prepared, of each* ʒ ij. *of Turbith and of Mechoaca, of each* ʒ j. ß. *of Epithymum or Wild Time, and of yellow Sanders, of each* ʒ i. *of Coriander Seeds* ʒ i. ß. *ſbreded and bruiſed, and prepare according to Art, a ſmall Bag of them for* iv. *Gallons of Drink. The Doſe is from* ʒ xij. *to a Pint, every day early in the morning, or twice or thrice a Week.*

The Reaſons of ſome Chymical Preparations.

Mercurius Dulcis.

Mercurius dulcis.

Take of Mercury ſublimate, corriſive ʒ vj. *of Quickſilver very well purged* ʒ iv. ß. *pound them together in a Glaſſen Mortar to a perfect mixture, then let them be ſublimed in a Furnace of Sand, increaſing the Fire to the height by degrees, for* 12. *hours, then ſublimate them again and again, adding the Mercury, which in the ſubliming grew crude: at laſt when the matter is perfectly ſublimated, pure and white, take out the droſs, and gathering it together, keep it for your uſe. The Doſe is* gr. xv. *to* xxx. *by it ſelf, or with the addition of other Purging Ingredients, to carry the Mercury quickly off by Siege, without the danger of ſalivation.*

Corroſive Mercury ſublimate, out of which the *Mercurius Dulcis* is made.

Mercury ſublimate corroſive.

Take of calcined Vitriol ℔ j. *of Sea Salt calcined, and of the beſt Nitre, of each* ℔ ß. *of purged Mercury* ℔ j. *pound them in a Glaſſen or a Woodden Mortar to a perfect mixture, adding a little Aqua fortis, or Spirit of Vinegar. Sublime them in an Oven of Sand, increaſing the fire gradually to the height; do it over again, if need be, that the matter being ſublimated to the ſides of the Veſſel, may gain a white, ſnowy colour. This buſineſs will go the better forward, if the Quickſilver be diſſolved in Aqua fortis diſtilled out of the aforeſaid Minerals, and then the matter, when the moiſture is taken away, be ſublimed upon a fierce fire.*

The reaſon of both.

Now as to the reaſon of the aforeſaid Medicin, in the firſt place, concerning the corroſive Sublimate it is plain enough, that the Mercury is diſſolved by Salts (whether they are in the Minerals themſelves, or in the *Aqua fortis*) and being as it were coagulated with them, is ſublimed by the force of the fire: and then that by the ſame Salts which congele the ſaline particles of the Mercury, and hide the reſt of them within their pores, the ſnowy colour, as it were, is produced; and that at the ſame time the corroſive quality ariſes from the extreme ſharp ſmall ſurfaces of the ſame Salts. Furthermore, as to the taking off of that ſame ſharpneſs by the repeated ſublimation after the Quickſilver is added and incorporated, in almoſt an equal quantity; the reaſon

ſon is, becauſe the ſharp ſalt particles are ſo rebated and weakened by the Mercurial ones that are copiouſly augmented, and ſtick to them on all ſides, that they do not prick or lance (as it were) the ſenſitive fibres at all in that manner as they did before: Beſides, The Powder of this ſublimate when it is pounded in the Mortar grows yellow by reaſon of the quantity of Mercury that doth as it were emerge. But that the common Precipitate, in which the Mercurial particles exceed the Saline ones that are congealed, is extremely corroſive; the reaſon is, becauſe the ſmall parts of the fire ſharpen all the mineral particles, in as much as they drive out all the gentle atoms, and ſtick or cling to the mineral corpuſcles themſelves, which are exceſſively pungent or pointed.

2. *Roſin of Jalap.*

Roſin of Jalap.

Take of the Roots of Jalap, that is ponderous, black and bright, beaten ſomewhat thick ℔ j. *of Spirit of Wine* ℔ iij. *digeſt them cloſe and hot for two or three days, then put the tinged* [*or died*] *ſpirit into a glaſſen Cucurbit* [*or Gourd*] *a Chymical Veſſel ſo called*] *and draw it off* [*or let it evaporate*] *till the fourth part onely remains; into which if you put or inſtill cold Water, the Roſin will ſink to the bottom of the Veſſel, which when you have waſhed from the dregs and dried it, you may keep for your uſe. The Doſe of the Powder thereof is* gr. vj. *to* xij. *or* xiv.

The reaſon of this Preparation.

In this Preparation the Spirit of Wine extracts or draws forth the ſulphureous particles of that ſubſtance, and ſo much the eaſier, in as much as theſe were before hand, of themſelves, ſeparated and gathered together in the mixed body; as you may conclude from the Veins which are roſiny and ſhine. Whileſt the ſulphureous part is extracted, ſome quantity alſo of the ſaline ſeems to be joined with it; and that is the reaſon that this Roſin which ſmells very ſtrong, and is ſharp to the taſte, purges violently, and is eaſily ſet on fire. This works ſtronger, and in a leſs quantity than the mixed body it ſelf when it is whole, for as much as all the active particles are united together, and the dull ones removed.

3. *Roſin of Scammony.*

Roſin of Scammony.

This is prepared in the like manner as Roſin of Jalap; but in this Medicin, in as much as the ſaline particles, many of them, fly away whileſt it diſſolves, and are not all gathered together in the Roſin with the ſulphureous ones, the operation thereof is gentler and weaker than that of the whole mixed body. For though there be a great quantity of Sulphur in the Scammony, yet the operation thereof depends very much upon the ſaline particles: wherefore whileſt the Powder of it is ſmoked by Sulphur burnt under it, the purging quality is much weakened; in as much as the acid Salts that are ſent forth with the Smoke, do ſubdue or fix the particles of that mixt body which are otherwiſe ſaline. After the ſame manner as out of Jalap and Scammony you may make roſiny Extracts out of Turbith and Mechoaca.

4. *Extract of Black Hellebore.*

Extract of black Hellebore.

Take of the fibres of black Hellebore ℔ ß. *bruiſe them in a ſtone Mortar, ſprinkling them with* ʒ iii. *of the beſt ſpirit of Salt; then put them into a Matrace, and pour to them* ʒ *pints of thin ſpirit of Wine impregnated with Salt of Tartar till it grows yellow, adding of Lignum Aloes and Cloves bruized, of each* ʒ ij. *Digeſt them cloſe and hot in Sand for three or four days; then filtrate all the Liquor, and let it evaporate over the heat of a gentle Bath to the conſiſtence or thickneſs of an Extract. The Doſe is from* ℈ j. *to* ʒ j.

This Medicin works in a leſſer quantity and more gently than the Powder of the roots, becauſe the active and benign particles being ſeparated from the reſt, which are both duller and virulent, as likewiſe being more fixed and ſubdued by the Salts of the Menſtruum are of themſelves reduced to a maſs: And moreover, by reaſon of the Salts joined with it, which boyl up and ferment with the Salts that are in the Bowels and Humours of our bodies, it is more effectual.

So much for Medicins, that being ſwallowed into our Stomachs, direct your operations moſt commonly through the moſt open paſſages, and as it were, the Kings Highways, to wit, upward or downward, through the Weazon into the mouth, or through the Guts to the *Anus*, or Fundament. There are a great many others of ſeveral ſorts, which, deſigning to go both the ways that thoſe do, exert their actions upon the bloud and the nerves with different reſpect to the Heart, Brain, Reins, and other Bowels, or the habit of the whole Body. Of which at laſt we will ſpeak in their turn, after that I have ſaid ſomewhat firſt of exceſſive purging, and eſpecially of the Dyſentery [or Flux] at *London*.

Phar. Rat. Part I.

CHAP. III.

Of the Remedy for exceſſive Purging, or of Medicins that ſtop too violent Purgation, or a Lask. As alſo of the London *Dyſentery, into the Nature and Cure whereof we here inquire.*

TO order Purges as well as Vomits aright we muſt make uſe of Bridles as much as Spurs, that is, ſomething to reſtrain Nature, as well as to provoke it. For as Purging Medicins are ſometimes of neceſſary uſe to lubricate the Belly, or to cauſe a plentiful evacuation; ſo, if that evacuation be immoderate, or not eaſily to be born, you muſt apply remedies that are contrary and antidote to a Lask of Flux, called a Dyſentery. How and in what manner purging Medicins perform their operations, and alſo for what reaſons, and upon what occaſions ſpontaneous Purging doth frequently happen, I have formerly ſhewn. At preſent I ſhall lay down in every caſe, to wit, both in exceſſive Purging cauſed by Medicins, and alſo in a Lask and Dyſentery, the ways to cure them, with the choicer Receipts for their Remedies.

The reaſon of exceſſive Purging cauſed by Medicins.

A purging Medicin that is diſproportionate either in quality or quantity, worketh more ſtrongly and longer, not onely for that, by irritating the nervous fibres too much, it forces the animal Spirits into diſturbances that are not eaſily appeaſed, but alſo in as much as it diſſolves, and as it were, melteth the bloud and humours; ſo that the melting parts of them being diſcharged into the cavities of the Bowels create ſtill greater expulſive irritations.

The care to prevent it;
1. Before the Medicin is given.
2. In the operation of it.

The method of Practical Phyſick reſpecteth both the prevention and curing of exceſſive Purgations. As to the firſt there is need of conſideration and care before the Doſe is given, in its operation and after it. For firſt of all you muſt cautiouſly weigh the conſtitution, ſtrength and uſage of the body that is to be purged; then the nature, doſe, manner of operating, and ordinary effects of the Medicin that is to be given: and laſtly, it muſt be conſidered, from comparing of Symptoms or Tokens, how to proportionate the force of the agent to the ſtrength of the Patient. Secondly, Whilſt the Medicin is a working, ſee that the Bowels that ſerve for concoction as alſo the bloud and animal ſpirits be kept free from all other diſturbance. Wherefore at this time you muſt eat nothing that is thick or clammy, or ſo much as to moleſt the ſtomach; and have a great care of the outward cold, whereby the pores of the Body are bound up; in fine, let the mind be always calm and ſerene, and void of care, or ſerious contemplations. Thirdly, When the operation of the Medicin is over, you muſt allay the fury of the animal ſpirits, and cool the boyling of the bloud and humours: to which ends you may give an Anodynous, or gentle, ſleepy Medicin, according to the following Receipts.

3. After the operation of it.

Take of the Water of Cowſlip flowers ℥ ij. *of Cinamon infuſed with Barley, of Syrup of Poppies, of each* ℥ ß. *of Pearl* ℈ ß. *and make a draught, to be taken when you go to bed.* Or, *Take of Conſerve of red Roſes vitriolated* ℈ ij. *of Diaſcordium* ʒ ß. *of Pearl* ℈ ß. *of Diacodium a convenient quantity, and make a Bolus, to be taken at night when you go to bed.*

The Cure of exceſſive Purging.

But if ſo be that notwithſtanding ought by omitting this kind of caution, exceſſive Purging follows upon the taking of ſuch a Cathartick Medicin, immediately the Patient muſt be put into a warm bed, and treated in manner following. In the firſt place you muſt apply either a Plaiſter of Treacle, or a Fomentation of the decoction of Wormwood, of Mint and Spices, in red Wine, with locks of Wool, dipped in and ſqueezed: then preſently let the Patient take either a Bolus of Treacle of *Andromachus*, or the diſſolution of it made in Cinamon water. Beſides which, let him drink burnt Wine, diluted with Mint water oftentimes by Spoonfuls. If he be troubled with the Gripes, let him take a Clyſter of warm Milk with Treacle diſſolved in it; and in the mean time let his outward parts be rubbed with warm clothes, and ſometimes bound about in certain parts, to call the bloud outward, and keep it from too great colliquation and flowing into the cavities of the bowels: after which, at Evening, if his ſtrength will permit it, and that the Pulſe be ſtrong enough, let him take a Doſe of *Diacodium* or *Liquid Laudanum*, with a convenient vehicle.

What is to be done in Symptomical Lasks.

As to other ſorts of exceſſive Purgations, which, without giving of a Purge, are wont to happen from ſeveral cauſes and upon ſeveral occaſions, and require a Medi-

cin,

cin, I ſay, that many of them being meerly ſymptomatical depend upon other Diſtempers, and that the cure of them is altogether the ſame as that of thoſe other Diſeaſes whoſe off-ſpring, as it were, they are. So if in the Scurvy and a Conſumption it hath been uſual for the Parties ſo affected to be troubled with looſneſs, the method of curing them reſpecteth not this ſymptom at all, but the cauſe of the primary Diſtemper, which is to be removed. But yet notwithſtanding, the looſneſs of a mans belly (which is ordinarily called either a Diarrhæa [or Lask]or a Dyſentery [or Flux)] ſeems ſometimes a Diſeaſe of it ſelf; and indeed in this City of *London*, ſince this ſort of Diſtemper, which hath uſed to reign almoſt every year, is commonly accounted popular, and almoſt proper to the Place and People, it will be convenient here to inquire into the Nature, Cauſes, and Cure of it a little farther. *Phar. Rat.* Part I.

The London *Dyſentery.*

Although the word [Dyſentery] in the common acceptation thereof, ſignifies a Bloudy Flux of the Belly, as a Diarrhæa [or Lask] doth that of the Humors; yet, ſaving the Etymology, I ſhall apply that name to this *London* Diſeaſe, even when it is not at all bloudy. For I have often and a great while ſince obſerved, that there are two very different ſorts of this ſame Flux, which almoſt every year is wont to be ſo rife here about Autumn, and is commonly called in our language, *The Griping of the Guts*; in the one whereof the Stools were watery, and as it were, limpid [or clear] with a ſudden weakning of the Body; in the other they are bloudy, but tolerable; whileſt in the mean time the ſiege is rarely cholerick or phlegmatick (whileſt either of theſe Diſtempers reign) which ſhews that the malady is not ſo obſtinate as one would think. Now that you may clearly know both theſe dyſenterical Diſtempers, as to their formal reaſons and cauſes, as likewiſe their differences from each other, I think it will be neceſſary to ſubjoin in this place an Account of them both as they were obſerved (and then exactly deſcribed) by me ſome years ſince when they were rife. *Two ſorts of it, a bloudy and a watery one.*

A Diſcription of the former.

In the year 1670. about the Autumnal Æquinox [or in Autumn, *i.e.* the Fall of the Leaf] a great many were ſick of an unbloudy, but a very ſharp and dangerous Dyſentery. The Diſtemper came upon them on a ſudden, and oftentimes without any manifeſt cauſe, and reduced the Patients, by grievous Vomiting, frequent Stools, and thoſe watery ones, in a ſhort time to very great weakneſs, horrid faintings of their ſpirits, and deſtruction of their ſtrength. I knew a great many that though the day before they were well enough and very hearty, yet within twelve hours were ſo miſerably caſt down by the tyranny of this Diſeaſe, that they ſeemed ready to expire, in that their Pulſe was weak and ſlender, a cold Sweat came upon them, and their breath was ſhort and gaſping: and indeed many of them that wanted either fit Remedies, or the help of Phyſicians, died quickly of it. This Diſtemper raged for a whole Moneth, but began to decreaſe about the middle of *October*, and before the firſt of *November* was almoſt quite gone. Few at that time had bloudy Stools, and not many cholerick ones, but a great many had both Vomitings and Evacuations that were wateriſh, almoſt limpid, and in great quantity. And whileſt this common Dyſentery raged ſo ſeverely within this City, there was ſcarce any one ſick of it in the Country, or at leaſt above three miles off. Moreover though very many were ſick in this place, the Diſeaſe did not ſeem to be infectious, but onely to affect thoſe that were prediſpoſed to receive it. For in the ſame Family thoſe who converſed with the ſick, were no ſooner ſeized by it than ſuch as moſt avoided their company.

The Cure of it.

For the cure of this Diſtemper, no Evacuation availed, but on the coutrary, Bloud-letting, Vomiting and Purging were always hurtful; but Remedies that were moſt commonly Cordials, and thoſe very hot; that is, ſuch as abounded with volatile Spirit, and Sulphur or Salt, were helpful; inſomuch that Spirit of Wine a little burnt with Sugar, was the popular, and as it were epidemical or univerſal Remedy; and in ſuch a Dyſentery almoſt always good; though in the other, which was bloudy, being indifferently uſed, it was often found to be dangerous. The Method of curing it, that I took at that time in moſt caſes and with ſucceſs, and that which I upon the like occaſion ſtill uſe, was as followeth.

A Bolus.

Take of Treacle of Andromachus ℥ j. *or* ʒ j. ß. *and take in Bed, drinking thereupon of the following Julap* vij. *or* viij. *Spoonfuls, and repeat it every third, or fourth, or fifth hour.*

A Julap.

Take of Mint water, and of Cinamon infuſed with Barley, of each ℥ iij. *of ſtrong Cinamon, of Plague and Treacle water of each* ℥ij. *of Powder of Pearl* ℥j. *of Sugar chryſtallized* ℥ ß.

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mingle it, and make a Julap. At the same time take a Cake of toasted Bread spread over with Treacle, and dipped into hot brisk red Wine, and apply it to the Stomach, changing it for another ever now and then.

Opiates. At Evening, if the Pulse and breath be strong enough, let the Patient drink of *Liquid Laudanum* prepared with Quinces gr. xx. in a draught of Plague water.

Take of Diascordium ℥ j. *of Liquid Laudanum* ℈ ß. *of Powder of Crabs Claws compounded* ℈ j. *of Cinamon water a convenient quantity, and make a Bolus, to be taken when you go to bed.*

Those that cannot take Treacle or Mithridate, but find it disagrees with them, may take a Dose of the following Water, or spirit of Treacle, every third hour with the Julap.

A Powder. *Take of the Powder of Crabs Claws compound. of the Roots of Contrayernum and Virginia Creeper of each* ℥ j. *of Cinamon and the Roots of Tormentil, of each* ℥ ß. *of Saffron, and of Cochinele, of each* ℈ j. *and make a Powder. The Dose is* ℥ß *to* ℈ ij.

A Spirit. *Take of Spirit of Treacle Armoniack* ℥ iij. *The Dose is* ℈ i. *with the Julap, every fourth hour, or between times before and after the Doses of the Powder. In the same manner you may use Spirit of Hartshorn or of Soot. Let your drink be Ale with a Toast and Mace, and Cinamon, sweetned; or burnt Wine diluted with Mint water. Let your food be Chicken broth, or Grewel, or Panada with shavings of Hartshorn, Ivory, Roots of Scorzonera, &c. boyled in it.*

The reason of this Distemper. Concerning the reason of this same popular Distemper, in the first place let us inquire what may be the principal or immediate cause of it: that is to say, what humour that is which by its offensive and burdensom quality doth so infest the bowels, and irritate or provoke them into expulsive contractions with Gripings, disturbance of the whole body, and a sudden debilitation or weakening of all its forces. Surely no man will think it to be the Gall or Sweetbread juice, or any other that is generated within the passages of the Guts: nor indeed do I believe it to be poured forth from the bloud alone into the bowels (as it often happens in the Crisis of a Fever) but I rather suppose (what a man may guess from the sudden languidness, quick fainting of the animal spirits, and weakness of all the parts) that in this Distemper, the best juices of the Body, that is to say, the nervous and nutritive, that is joined and united to the solid parts, are totally vitiated in their temper, and being made fluid, as it were, are melted, and so run into the mass of bloud; then immediately from thence (since they are incongruous, unmingleable, and unapt to be carried off by Urin or Perspiration) they are transferred through the *Vasa cœliaca* [Belly Vessels] toward the Stomach and Guts, and there flowing out at the numerous thickset mouths of the Arteries, cause these horrid symptoms of a Dysentery. Moreover it is likely that the very bloud also being mixed with a deluge of other humours is melted at the same time, and being dissolved in its temperament, poureth out its melted parts with its other dregs into the cavities of the Bowels.

It arises first from the vitiation of the nervous juice. Most certainly there is no other reason why all the motive fibres should be so suddenly weakned, and the whole Body languish, but that the humour that actuates or enlivens them, and in which the animal spirits reside, forsook them totally, and flowed out; and indeed we suppose it to flow out, in as much as being vitiated in its temper, it not onely molesteth the containing parts like sowering Milk, but puts them upon shriveling themselves with such a motion as throws that Humour out. Besides, I almost always observed that this Distemper began with a chilness; but not such as was followed with the heat and burning of a Fever, because the bloud, although in it self but little vitiated, yet being almost overwhelmed by a Floud of other juice that came in upon it, could not recover or recollect it self so far as to boyl up feverishly or into a *Crisis*. For this reason Cordials (but none except the strongest and hottest) as also hot Waters and Spirits, Treacle, Mithridate and the like were of use: that is, such whose particles being extreme active, would repel or drive back the Humours that were ready to flow out, whilest they easily get into the mouths of the Splenchnick [or Bowel] Vessels; and likewise such as gradually insinuating into the mass of bloud might strengthen and excite it to a fermentation and a motion to sweat; whereby it might not onely recover its former temperament, but also retort or throw back into the habit of the Body what ever was carried into it that was disagreable.

So

So much for the immediate or conjunct cauſe of this diſtemper, the more remote are original or antecedent, and manifeſt or evident; the former of which denotes from what occaſion or original this kind of morbid and infectious diſpoſition proceeds, and the latter, through what cauſes it the ſooner breaketh forth into a Dyſenterical Diſtemper. As to the former, this Diſtemper, becauſe it rages moſt commonly in Autumn is aſcribed by many to the immoderate eating of Summer, or rather Autumnal Fruits; which indeed I could eaſily admit to be partly the cauſe of a Bloudy Flux; nay, I have reaſon alſo to think that in ſome perſons the aforeſaid Diſeaſe had from thence a kind of ſeminal origination. But that this is not the total and adequate cauſe of that Diſtemper is plain even from hence, becauſe many Inhabitants of this City, who abſtain from Fruits, or uſe them more cautiouſly, were ſick of an unbloudy Dyſentery or Flux, whileſt it was Epidemical or rife; and others that eat a great deal of Fruit in the Neighbouring Villages, were altogether free from this, though troubled with other Fevers, but without any Gripings or Fluxes. For I have oftentimes obſerved (what happened alſo in this year) that after an exceeding hot and dry Summer, an Epidemical and unuſual Fever hath been very rife at Autumn in many places of *England*, and that at the ſame time in *London* very few have been ſick of that Fever, but a great many of the Dyſentery or Flux: the reaſon whereof ſeems to be, that ſince our Bodies, by reaſon of the foregoing unſeaſonableneſs of the Summer, are diſpoſed for autumnal Fevers, thoſe, in this ſmoaky thick Air, are the rather determined to this kind of Diſtemper. For when tranſpiration is hindered, the corruptions of ill Humours, being unapt to make their paſſage through the pores of the Skin, ſettle on the inſide, and there breaking forth out of all the Arteries at once, are the cauſe of theſe horrid effects in the Bowels.

The remote cauſes of it.

Why it is Autumnal and Epidemical.

The firſt cauſes of it are, 1. *The thickneſs of* London *Air.*

Moreover the Summer, as it is more or leſs hot or cold, moiſt or dry, maketh a great alteration in the Humours of our Bodies, as it doth alſo in all fermentative juices, and changes them oftentimes from their natural habit into a ſharp, ſower, or aduſt temper. And then ſome years this change is impreſſed chiefly upon the bloud, though in other years it is more upon the nervous juice. From the former moſt commonly follow Autumnal, or acute, or intermitting, but very ſevere Fevers. From the latter ariſe irregular and unuſual Fevers; in which very dangerous diſeaſes in the Brain and Nerves enſue, and are very rife without any great heating of the Bloud, or Criſis of the diſtemper. Moreover in this ſort of Diſtempers, either the dregs of the nervous juice which gradually and inſenſibly decays, being ſlowly and by degrees without any critical turgeſcence, or ſwelling gathered together, and remaining for a long time within the containing parts, produce Fevers in the Nerves with ſluggiſhneſs and dizzineſs (ſuch as I formerly deſcribed in my Treatiſe called *Spaſmologia* [or of Convulſions:] or the corruptions of that juice which is ſuddenly and much altered in its temperament, being more fierce and active, ſwell with a kind of fluidity, and run over out of the fibres, the nervous and ſolid parts on all ſides into the maſs of bloud, and from thence flowing preſently into the cavities of the Bowels produces this unbloudy kind of Dyſentery, ſuch as is here juſt now deſcribed. And indeed that this ſame watery Flux proceedeth from a depravation and colliquation or melting, as it were, of the nervous and nutritive juice, rather than of the Bloud it ſelf, is evident, not onely from the ſudden and great dejections of the Spirits (which ſuch an effuſion of more bloud could never cauſe) but likewiſe from hence that thoſe who are ſick of this Diſeaſe, are not troubled with heat or droughth in their mouths, or roughneſs on their tongues, but well endure the hotteſt Medicins; and as ſoon as by the application of ſuch Medicins the peccant or offending humour is inverted, and retorted into the habit of the Body, they quickly recover without either Fever, wakening, or any other conſequences of corrupted bloud.

2. The unſeaſonableneſs of the Year.

As to the evident cauſes of this Diſtemper I need not ſay much, ſince the conſtitution of the Year is ſuch, that through the malign influence of the Air or Heavens, the juices that are generated from the bloud, that is to ſay, the nervous and nutritive do degenerate from their genuine temper, into another nature, which is offenſive, and as it ſeems, ſower, and conſequently dyſenterical, or inclined to a Flux. Errours in Diet, and other unnatural things at that time committed, do cheriſh and augment that ill diſpoſition, and bring it much the ſooner to a fulneſs that ſwells even to evacuation. It will not be worth my while here to recount particularly all the manifeſt cauſes and occaſions by which they are produced, but rather let us go on and ſhew the nature of that other, to wit, the Bloudy Dyſentery or Flux.

The evident cauſes of it.

Of

Phar. Rat. Part I.

Of the Bloudy Flux.

The Deſcription of it.

The Fall of the Leaf in the Year 1670. (which was famous for the Unbloudy Flux juſt now deſcribed) was attended by a Winter that was exceeding cold, and ſuch an one as ſcarce any man living had ever known: nor did the following Summer participate leſs of the other extreme, being extreme hot and dry; and in the Autumn after that there was an Epidemical or univerſal Fever that raged almoſt all over *England*. This Fever, obſerving the form of an intermitting one, had Fits ſometimes every day, and ſometimes every other day, but with none or onely very little cold, though with exceſſive heat, which laſted for many hours together, and many times above a day and a night, but hardly paſſed into Sweat, or if it did, it was but in ſome parts, and that oftentimes interrupted too, without any remiſſion after it. Thoſe that had this Diſtemper were preſently taken with an unuſual languidneſs, with wakening, dizzineſs, and oftentimes the Head-ach very intolerably: and the diſeaſe which was ſeldom or never capable of a perfect *Criſis* [or Judgment of Phyſicians] continued very long, and oftentimes having fixed an incurable Malady in the Head or Breſt, ended in a Diſtemper that was ſleepy or conſumptive, and many times deadly. I formerly deſcribed a Fever that was like this in my Treatiſe called *Puretologia* [or an Account of Fevers] together with the Nature and Cure of it; before which alſo went the like conſtitution of the Year.

An irregular Fever uſes to be at the ſame time with this in other parts of England.

But whileſt this Fever raged almoſt in all parts of the Country, through the Villages and Towns, there was a Flux at *London* which was really a Bloudy one; and not onely ſo, but extraordinary ſharp and ſevere, inſomuch that it tumbled a great many People ſuddenly into their Graves. When this Diſtemper came firſt upon a man, he moſt commonly voided Bloud very plentifully and frequently with pains and gripings in the belly; long watchings with feveriſhneſs, and extreme thirſt uſed to afflict him; yet their ſtrength continued ſtill ſo firm, that thoſe who were ſo affected, after they had been ſick about a Week, and gone to Stool almoſt twenty times every day, could riſe out of their Beds. Though the bloudy evacuations ſeemed terrible, yet the Patients did not die ſuddenly, but continued ſeveral Weeks, yea ſometimes Moneths, voiding Bloud every day in great quantity; and at length, when the Diſtemper growing ſtill worſe and worſe, tended to their deſtruction, there appeared before their death other ſymptoms, and eſpecially watchfulneſs, roughneſs of the tongue and mouth, thirſt, and ſometimes deſtructive Thruſhes; and if the Flux were reſtrained, or ſtopped unſeaſonably, or ſooner than it ſhould have been, thoſe ſymptoms broke forth the ſooner, and ſignified great danger of death. Poor People that had for a long time been uſed to an ill ſort of Diet, and ſuch alſo as had either no care taken of them at firſt, or at leaſt all remedies miſapplied, oftentimes died, or with great difficulty recovered: On the other hand, thoſe that were happy in a better habit of Body, and truſted to ſeaſonable and proper Phyſick, many times eſcaped. Moreover the Diſtemper it ſelf, though it were Epedemical, or univerſal, yet it was not equally malignant in all perſons, but ſeemed in ſome more mild, and in others more ſevere; that is, the Flux at the beginning was ſometimes gentle, and not unlike to a Diarrhæa, or Lask, in which tho the Stools were frequent, yet being without pain, or much bloud, they were eaſily, and ſometimes quickly cured. But ſometimes again this Diſtemper ſeemed very ſharp and horrid, that is to ſay, when the bloud was poured forth in great quantity, with gripes and extreme torment. But in ſome People the Stools were liquid and died with pale bloud, like the waſhings of raw fleſh, whileſt in others they were thicker, full of bloud, and alſo ſtuffed with a whitiſh ſlime, as likewiſe very often with bits of membranes. The ſeat of pain being ſometimes higher and ſometimes lower, ſhewed that the ſmall Guts in ſome, and that in others the bigger were the more affected.

The way to cure it.

The way to cure this Diſtemper, with remedies that I found helpful to very many People, was as follows.

First, In ſome meaſure to ſtop or moderate the Flux.

A Bolus. *Take of Treacle of Andromachus* ℥ j. *of liquid Laudanum prepared with Quinces* gr. xx. *and make a Bolus, to be taken when you go to bed.*

An Electuary. *Take of Conſerve of Red Roſes vitriolated* ℥ ij. *of Treacle of Andromachus* ℥ j. *of Powder of the Roots of Tormentil and Contrayernum, of Pearl and prepared Coral, of each* ℥ j. *Syrup*

Syrup of dried Roſes a convenient quantity, and make a Confection, to be taken every fourth or fifth hour in the quantity of a Cheſnut, drinking thereupon ℥ iij. *of the following Julap.* *Phar. Rat.* Part I.

Take of Mint Water, of Balm, and of Cinamon, Barly Water, of each ℥ iv. *of Treacle and Plague Water, of each* ℥ ij. *of Pearl* ʒ j. *of Sugar* ℥ j. *mingle it, and make a Julap.* *A Julap.*

After one or two days give this purging, and yet ſtrengthening Potion.

Take of Rhubarb ſhreded ʒ ij. *of yellow Myrobalans ſhreded* ʒ j. ß. *of Red Sanders and Cinamon, each* ϑ j. *Make an infuſion all night in Plantaign Water and Cinamon infuſed with Barley, of each* ℥ ij. ß. *Squeez it well and put to it of ſtrong Cinamon Water* ʒ ij. ß. *and make a draught.* *A gentle Purge.*

Every Evening, and in ſome caſes alſo in the day time, I uſed to give a good Doſe of *Landanum*; nor did I ever know that this Medicin was hurtful to any one that was troubled with a Dyſentery or Flux; whether it were that the ſtupifying quality of the Medicin was overpowered, and as it were, tamed by the more acid juice of the Stomach, or rather, that the particles thereof being tranſmitted to the bloud, are thrown out again preſently from thence along with the Bloudy Stools, that they may not affect or hurt the Brain. *Opiates.*

Thoſe that cannot take, or do not find it convenient to take the aforementioned Confection, let them take in ſtead of it this following Powder.

Take of Red Pulvis Pannonicus, or Hungarian Powder ʒ j. *of Contrayernum Root* ʒ ß. *and make a Powder, dividing it into three parts, of which take one part in any Liquor.* Or, *Take of Bole Armeniack, an Alexiterium (that is, impregnated with the juices of the leaves of Tormentil, Biſtort, Red Roſes, &c. and dried in the Sun) and of Contrayernum Root, of each* ʒ j. *of Pearl, of Red Coral, and the whiteſt Amber, each* ʒ ß. *Make a Powder. The Doſe is from* ϑ ij. *to* ʒ j. *A Powder.*

Take of Radix Caryophillata or Avens root, of Scorzonera, of each ℥ j. *of Tormentil, Biſtort and Contrayernum, each* ʒ ij. ß. *of Harts horn burnt* ʒ iij. *of Shavings of Ivory and Harts horn, each* ʒ ij. *of Cochinele* ʒ ß. *of the Flowers of Red Roſes* ʒ ij. *and boil them in a convenient quantity of Spring water to two Pints. About the time that you have ſo done, put to them, of the Conſerve of Red Roſes* ℥ iij. *and to the clear ſtraining of it add of Plague water* ℥ iv. *The Doſe is* ℥ iij. *An Apozeme, or Decoction.*

For allaying the Gripings in the Guts, and to cure the gnawings in them many times Clyſters are of good uſe.

Take of the Decoction of the tops of Hypericon or St. Johns Wort, with Sheeps Feet, or the Meſentery of a Sheep ʒ viij. *or* xij. *of Treacle of Andromachus* ʒ ij. *of Oil of Hypericon* ℥ j. ß. *and make a Clyſter.* *A Clyſter.*

I here omit many other Forms of Medicins that are extant every where in the Books of Practice, and which every one upon occaſion may and ought to preſcribe. We have nothing elſe to do but to enquire a little into the reaſon of this Diſtemper which was Epidemical, or rather popular and peculiar to ſuch a place.

From what I have already ſaid, it is evident enough that the Dyſentery or Flux (neither the Unbloudy, nor the Bloudy one) doth not proceed meerly from the ſharper matter which is contained in the Guts. Moreover as that other Diſtemper ſeems to have had its original from the flowing of the Nervous Liquor and Nutritive Juice, that was degenerated, ſo this had it chiefly from the corruption and vitiation of the Bloud; and therefore as there was elſewhere a Diſtemper of the Nerves which was contemporary of that Endemious or popular malady in this place, ſo when a Bloudy Flux afflicted the *Londoners*, an intermitting Fever much like to a Semitertian (as it is deſcribed by the Phyſicians) infeſted all *England* beſides. And indeed it will be eaſie enough to conceive, that ſince the Bloud being roaſted, as it were, with the Summer heat, and conſequently about Autumn apt to riſe into feveriſh effervеſcences [or boylings] and, like Wines, into immoderate Fermentations, whereby they are purged, if

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Phar. Rat. Part I.

it cannot carry off the degenerous and excrementitious particles (by reason that Transpiration is hindered in a thick Air) the ordinary way by Sweat, that being still in a boyling heat, it transmits them toward the Guts, and endeavours to throw them out through the mouths of the Arteries that are there thick set and much wider than the pores. But then if the incongruous dregs, or morbid corruptions of the Bloud when degenerated, being throughly mixt with it, and intimately confounded in it, cannot be easily separated or drawn off; it therefore being big and oppressed with this load, is very much streightned in its circulation, as it passes through the smaller Vessels; and consequently about the inward surface of the Guts, where the coats of the Arteries are more tender, and the mouths wider, the Bloud that begins there to swell, and at the same time is thickened by the heterogeneous particles, wherewith it is filled, being apt to coagulate, doth easily break forth; and seeing it cannot separate and cast forth its dregs, it pours forth some portions of it self that are most offensive to them.

Three things concur to cause this Distemper.

Wherefore to cause a popular Dysentery, these three things must needs concur; that is, In the first place the mass of Bloud must be vitiated, through the unseasonableness of the Year, whereby it may be inclined to feverish effervescencies [or boylings] either on its own accord, or occasionally. And that is the reason that when this Distemper is at *London*, an irregular Fever uses to rage in other places. Secondly, The dregs and corruptions of the Bloud, so boyling and degenerated from its temper, are so intimately mixt and confounded with it, that they cannot be easily separated, or be thrown out either by Sweat or Urine of a sudden. Whereupon I have observed, that the Fever which was contemporary with this Dysentery, was always of a long continuance, and very hardly capable of any true judgment; as also that the Fits of it scarce ever ended in a remission. Thirdly, Add to these the stoppage of the Pores (which determins the aforesaid dispositions into a Bloudy Flux) which is caused by the smoky and thick constitution of the Air: For this directeth the purgative boyling of the Bloud toward the Guts; where seeing the dregs thereof cannot be separated and easily parted from the other mass of Liquor, it self spontaneously flows forth by portions that are most infected, and consequently ready to be extravasated or thrown out of their Vessels.

This Distemper is either more mild or malignant.

By this means the ordinary *London* Dysentery, which is not very malignant, is usually produced; which though it be presently horrid or dreadful by reason of its bloudy Stools, and most commonly of a long continuance, yet it is not very contagious, nor often mortal. But this Distemper also being sometimes virulent, and as it were pestilential, kills a great many People, diffusing its infection very largely by contagion. Moreover in such an habit of the Bloud, the parts of it being touched with a kind of malignity, begin to be corrupted as in a Plague, and ought immediately to be separated from, and thrown out of the rest of the mass, lest the whole should be thereupon infected: which portions, notwithstanding, being thicker than ordinary, and consequently apt to be purged forth through the Belly rather than through the habit of the Body or by Urine, are carried by the passage of the *Arteria Cæliaca* and *Mesenterica* into the coats of the Guts; where they do not easily part from the rest of the bloud, but partly breaking out of the Vessels, cause bloudy Stools, and partly fixing in the membranes of the Guts, beget in them either inflammations or ulcers, or sometimes also mortifications, which occasion sudden destruction.

So much of the causes (both immediate and antecedent) of a Bloudy Flux, as it uses to be the peculiar Distemper of this place about Autumn. As to the manifest causes or occasions that bring the morbid disposition the sooner into act, they are to be reckoned chiefly an ill course of Diet, and the pravity or badness of the Air that we breath in: and that is the reason that in all Countries it is very common in Camps among Souldiers, and in Prisons among Captives, by reason of the stench of the place and their ill diet. Moreover many other errours in unnatural things ought to be referred to this head, of which I have no leisure, nor were it worth while in this place particularly to discourse.

The ways to cure it.

Two in respect of the Bloud;

The chief and primary means into which the method or practice of Curing this Distemper, which is before shadowed out, may be resolved, are four; that is to say, two in respect of the Bloud, and as many in respect of the Bowels. And first, as to the Bloud, it will be necessary to drive forward not onely the dregs and corruptions thereof (that would go inward) outward toward the habit of the body, to the end that they may exhale by transpiration, but also to dissolve the coagulations of it, and restore its temper as much and as soon as possible. The former of which is performed by Sweating Medicins, and the latter by convenient *Alexipharmica*, or Medicins that resist and rectifie corruption.

And two as to the Bowels.

Secondly, as to the Bowels, the painful sense of the

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nervous fibres ought to be allayed, as likewiſe the irritation or provocation of the fleſhy ones, by which they are excited to expulſive convulſions, and alſo the mouths of the Veſſels ought to be ſhut, leſt they pour forth the bloud and humours into the paſſages of the Guts. The former of theſe is uſually effected by Opiates, and the other by Remedies that are ſtyptick or aſtringent; beſides which you ought to take care of the moſt urgent ſymptoms and evil diſpoſitions that are uſually incident to this Diſtemper, of which ſort in the firſt place are a Fever with Thirſt and Watching, Gripings of the Guts, and ſometimes Gnawing, Inflammation, and Ulcers. *Phar. Rat* Part I.

It will not be neceſſary to inſiſt upon theſe primary Indications, particularly and ſucceſſively, but it is my buſineſs to compriſe them all together, and ſet them forth at the ſame time. Wherefore the Receipts of ſuch Medicins ought to comprehend Remedies of ſeveral kinds, to wit, *Alexiteria*, or Medicins to expel or rectifie infection; *Stypticks*, or aſtringent Medicins; *Diaphoreticks*, or Sweating Medicins; and *Opiates*, or ſleeping and reſting Medicins. But becauſe it will not be eaſie to reduce theſe Medicins into a certain Method, or into precepts that may ſuit with ſo many conſtitutions, I therefore thought it better to give you at preſent ſome Examples of Dyſenterical Cures, done in the Autumn of the Year 1671. when this Diſtemper raged very much.

A young Gentleman about 25 years of Age, of a ſanguine temper, and a conſtitution formerly very hale, about the firſt of *October*, fell into a Dyſentery without any manifeſt cauſe; and though immediately from the firſt day his ſtools were plentiful and bloudy with Gripings, yet being ſtill ſtrong and well in heart, he deferred taking of Phyſick till the third day; at which time I was ſent for late at night, and preſcribed him this following Bolus. *The firſt Story of Cures in caſe of the Dyſentery.*

Take of Treacle of Andromachus ʒ j. *of Liquid Laudanum prepared with Quinces* ℈ j. *mingle them, and let the Patient drink thereupon a ſmall draught of the following Julap.*

Take of Water of Tormentil, Mint, and of Cinamon, Barly water, each ℥ iv. *of Treacle and Plague water, each* ʒ ij. *of Pearl* ʒ j. *of Sugar* ʒ j. *make a Julap.*

Then every third hour he took of the following Electuary about ʒ j. ß. with the ſame Julap.

Take of Conſerve of Red Roſes ℥ ij. *of Treacle of Andromachus* ℥ j. *of the Powder of the Roots of Tormentil, Contrayernum, Pearl and Coral prepared, each* ʒ ß. *of Syrup of Rhead Poppy, a convenient quantity.*

With theſe Remedies the fury of the Diſtemper was ſoon taken off, ſo that in four and twenty hours he had ſcarcely more than 6 or 7 ſtools, and ſuch too which did not appear very bloudy as before, but full of little bits of fleſh, as it were, pieces of the membranes: which no queſtion was occaſioned by ſome ſmall portions of the hairy veil which were gnawed off: every Evening he took Opiates with *Laudanum.*

The fifth day that he was ſick he took the following draught:

Take of Rhubarb ſhreded ʒ ij. *of yellow Myrabolans* ʒ j. ß. *of yellow Sanders* ʒ ß. *of Cinamon pulverized* ℈ j. *of Salt of Wormwood* ℈ ß. *make an Infuſion all night in Plantaign Water and Cinamon, Barley Water, of each* ℥ ij. ß. *to the ſtraining of which, add of ſtrong Cinamon water* ʒ ij. *A Purge.*

He purged three or four times, whereby he found eaſe, and the next day his Fever being abated he was better; in ſo much that ſeeming to grow well again, he eat fleſh; but by that means he fell into a relapſe, and the Dyſentery immediately returning with a Fever, was more ſevere than at the beginning: at which time, ſeeing the former Medicins began to be nauſeous to him, I preſcribed in manner following.

Take of the Powder of the Roots of Tormentil, Contrayernum, and of the Bolus called Alexiterium, each ʒ j. *of Pearl, red Coral prepared, and the whiteſt Amber, each* ʒ ß. *and make a Powder. The Doſe is* ʒ ß. *in* ℥ iij. *of diſtilled water.* *A Powder.*

Take of the Tops of Cypreſs and Myrtle, each iv. *handfuls, of the leaves of Medowſweet, Pim-* *A Diſtilled Water.*

Phar. Rat. Part I.

Pimpernel, and St. Johns wort and Avens, of each iij. *handfuls, of the Roots of Tormentil and Biſtort, each* ʒ vj. *of the Flowers of Red Roſes* iv. *handfuls, of Berries of Chermes* ʒ iv. *of Cinamon and Mace, each* ʒ j. *when you have cut them and bruiſed all to pieces, pour to them of red Florence Wine, and of red Roſe water, each* iv. *Pints; diſtil them with the common Inſtruments, and let the whole Liquor be mingled and ſweetned when he takes it with Syrup of Corals.*

He alſo took three or four times a day of the following Decoction ʒ iij. or iv.

A Decoction.

Take of Avens root and of Sconzonera, each ʒ j. *of Tormentil* ʒ ij. *of Harts horn burnt and pulverized,* ʒ vj. *of ſhavings of Ivory and Harts horn, each* ʒ ij. *of the tops of Hypericon one handful, of Flowers of red Roſes, and of Balauſtians, each one ſmall handful. Boyl them in ſpring water till three Pints ſinks to two, add at the end of Lisbon red Wine* ʒ iv. *of Conſerve of red Roſes* ʒ iv. *Let them boyl cloſe for an hour, and then ſtrain it through Hippocrates Sleeve.*

He every night took of *Liquid Laudanum* ℈ j. in ʒ iij. of the Dyſenterical water juſt now deſcribed, with Syrup of Clove Gilliflowers.

A Decoction for ordinary drinking.

For his ordinary Drink he had a Decoction of *Harts horn burnt, with Barley, a Cruſt of Bread, Mace and Cinamon, of which half a pound was put to a Pint of new Milk.*

The purging Infuſion was taken again, by the help of which and the former Remedies, within ten days the Fever went off, and the Dyſentery abated very much; which, though it were without Gripings, or much bloud, yet it ſtill continued with ſmall pieces of fleſh, bits of the Membranes, and phlegm or bloudy ſlime which he daily voided.

Therefore to ſtrengthen and heal the Guts, the following Remedies were given.

A Clyſter.

Take of the tops of Cypreſs, of the leaves of Vinca Pervinca, or Periwinkle, and Mouſe-ear, of each one handful, of the Flowers of red Roſes two ſmall handfuls: boil them in the Broth of Sheeps Guts. To a Pint of the ſtraining thereof, add of Oil of Hypericon, St. Johns wort ʒ ij. *of Honey of Roſes* ʒ j. ℈. *mingle it for two Clyſters, of which the one was given in the morning, and the other at* 5 *of the Clock in the Afternoon.*

A Plaſter.

A Quince made a Medicin.

He wore a Plaſter *of Red Lead and Paracelſus upon his Belly; and took alſo every day twice; of Plantaign juice ſqueezed out with Water of Scordium or Water Germander and Plague Water,* ʒ iij. *and likewiſe eat each day a Quince ſcooped, filled with the Powder of Olibanum, Maſtick, and Balſam of Tolu, and roaſted under the Aſhes.*

Having uſed theſe Remedies conſtantly, he perfectly recovered in a Moneths time.

The ſecond Story.

About the ſame time another ſtrong young Man fell into a terrible Dyſentery; and from the very firſt day his ſtools came from him very faſt, and mighty bloudy, with pain and gripings; as likewiſe an extreme Fever with exceſſive vomiting, thirſt and watching did afflict him; but when by his taking of Opiates theſe ſymptoms were ſomewhat mitigated, he was taken ſtrait with a degree of madneſs, called a *Pelirium*, and a ſwimming in his Brains, with an intermitting pulſe, and horrid numneſs, in as much as the malignant matter, being kept within, flowed preſently into the Brain and Nerves; but theſe indiſpoſitions were ſoon over, as often as the flux and vomiting returned. The fifth day he vomited a gory matter, and complained of the great pain and torture in his ſtomach as if he had had an ulcer in it; in ſo much that I really thought there might be ſome inflammation, or ulcer there, as it uſually happens about the Guts: but by taking of gentle Broths, his vomiting and gripings in the ſtomach were ſoon allayed, though the Flux in the mean time increaſed. He took that night of *Diacodium* ʒ j. with ſmall *Cowſlip and Cinamon water*, of each ʒ j. ℈. by which Medicin he was ſo much relieved, that he continued for a night and a day pretty well, without vomiting or pains, and onely a few ſtools, with a tolerable good pulſe and frequent ſlumbers; but the night following, though he took the ſame Opiates again, yet the Flux returned upon him very frequent and bloudy. The day after he took

Infuſion

Infusion of Rhubarb, with Myrabolans, Red Sanders, and Cinamon. He often voided cholerick matter, extreme sharp and altogether unbloudy; and then that Evening he took of *Liquid Laudanum* prepared with Quinces *gr.xxv.* in a Spoonful of Cinamon-barley Water, after which he had moderate and more quiet rest. Afterward being averse to any more Physick, he onely took an Opiate every Evening, sometimes one and sometimes another, and in a short time recovered. *Phar. Rat.* Part. I.

SECT. IV.

CHAP. I.

Of Purging by Urine, and of Medicins that provoke it.

I Have formerly treated very largely concerning the Nature and Composition of Urine, as likewise of the Offices thereof, whilest it is a part or dreg of the Bloud, together with its ways of separation. I shall now in this place observe, that there is some affinity between that and Sweat; in so much that they oftentimes change turns, and the matter of the one is conveyed forth at the Emunctories or Drains of the other. For perspirations through our skin, if they are too strong and impetuous, take away with them very much of the serous liquor that was designed for the Reins or Kidnies, and turn it into Sweat; so on the contrary, when the Serum is poured through the Kidnies in greater quantity than ordinary, it calls in to it a great many small particles, such as used to breath through the skin, and involving them in its torrent carries them off by the passages of Urine. Hence it comes that Diaphoretick and Diuretick Medicins [or such as provoke Sweat and Urine] are very nearly related as to their use, and sometimes reciprocal [or such, as that one may be taken for the other.] By both of them, when taken, the mass of Bloud is dissolved or precipitated, or at the least compelled to divide into several parts, to the end that the *Serum* or Whey, being separated from the rest of the Bloud, may be thrown out at the most easie passage. *The Relation between Piss and Sweat.*

Although the immediate matter of Urin flows onely from the bloud and be carried to the Kidnies and Ureters solely by the conveyance of the emulgent Arteries; yet it often uses to have many mediate fountains and those very different too; which may be distinguished in a threefold respect at most; that is to say, Piss is either a meer excrement, and a watery part of the bloud when it grows stale; which having circulated with it for some time, gains a lyish tincture from the saline and sulphureous particles that are incorporated with it. Or, Secondly, It is that dilute part of the Chyle, whilest it is yet crude, which being poured into, mixed with the bloud in great quantity, is separated again before it be infected with the tincture, and makes the Urin extraordinary clear. Thirdly and lastly, The matter of the Piss is often great part of it a kind of Water, poured, or as it were exstilled out of the bloud into the solid parts, glandules, and lymphæducts, which being copiously gathered there, and afterwards of its own accord, or occasionally gaining a fluidity, and running out of its receptacles through the lymphæducts [or water-passages] is carried back into the Veins; from whence with a swift motion, going through the Arteries unmixt, it is discharged into the Kidnies; and because no particles of Salt or Sulphur are mingled with it by reason of its short stay in the bloud, the Urine therefore is limpid or clear, as water. The Urin of men in health does most commonly partake in some measure of each of these, and according as this or that, or any other matter prevails, they appear more or less, or not at all died. The *Serum* whencesoever it comes, when mixed with the bloud, is separated again from it in its circulation, in divers places, but especially in the Reins. For the bloud boyling up, and being very much rarified within the Arteries, must of necessity cast off its serousness, and divert it some other way, that being separated thence it may pass into the Veins. Now this, as it is performed in all parts of the whole Body, so it is more copiously and in a peculiar manner within the Veins. But though People generally know and acknowledge that the separation of the *Serum* is made in this place, yet there are great controversies among them about the ways whereby it is performed, whilest some say that the serous Liquor is attracted to the Reins; others, that it is onely strained there; and others guess that there *What the matter of Urin is, and from whence it comes? It is threefold.* *How the Serum is separated from the bloud.*

Phar. Rat. Part I.

is a kind of ferment which lodges in the Reins, by the mixture whereof the whey of the bloud, like that of Milk, is dissolved and precipitated by the acid Rennet, as it were: and indeed the rancid and ungrateful smell and taste of this Bowel seem to argue that the thing is in some measure so. Before we can determine any thing certainly concerning the virtues and operations of Medicins that provoke Urine, we must of necessity explain this doubt, to wit, what is done in the Kidnies by the ordinary course of Nature, and what in the mass of bloud, for the separation of the *Serum*.

The Serum is not attracted to the Reins.

And first of all, that the *Serum* is not attracted to the Reins, needs no proof among Philosophers, since similar attraction is of late days quite exploded by most Virtuosoes, and all local motion declared to be performed by impulse onely. And truly, as to the present affair, to all those that are acquainted with the circulation of the bloud, it is very manifest, that as the bloud, so also the Serum of it, which is its constant companion within the vessels, is driven forward toward the Reins by the meer motion or impulse of the heart. But in order to shew you whether it be there separated by percolation onely, or also by a kind of precipitation it seems necessary to inquire a little more accurately into the Anatomy and use of the Reins.

The make of the Reins, &c.

Of the Structure or Make and Use of the Reins, since many, Ancient and Modern Authors have given us several accounts, the famous *Bellinus* hath most accurately delivered the Anatomy of them. Indeed every one may easily perceive that the bloud is carried to the Reins by the emulgent arteries, and back by the veins. This the Laws of circulation and ocular testimony do manifestly declare. But in what places, through what conveyances, and by what art the Serum is separated in the Reins from the Bloud, and discharged into the *Pelvis* [or Basin] was long unknown to the most diligent inquirers; till the aforesaid Author by great good hap found out that the substance of the Reins was neither a *Parenchyma* [or stuffing] as that of the Liver or Spleen; nor fleshy fibres, as the bodies of the heart and muscles, but an heap of membranous small pipes; and that the *Serum* being carried through those passages, though very extraordinary small ones, from the circumference of the Kidnies to the center of

The use of them.

it, was exstilled into the *Pelvis* or Basin. For the emulgent Artery being divided first into greater branches, and then into lesser, and at last into very small sprouts, conveys the bloud every way all over the outmost surface of the Kidney; and when the bloud boyling up and being rarified, flows out at the mouths of the Arteries, whilest the bloudy part, that is to be carried back, is received into the Veins, the serous or wheyish part gets into the exceeding narrow pores of those small pipes, which are impervious [or unpassable] to the bloud, and flowing through them every way toward the *Pelvis*, is discharged into the *substantia papillaris* [a part of the Kidney so called] out of which it drops by little and little into the *Pelvis*.

The Serum is separated by percolation.

From what I have said, it is manifest that the *Serum* is separated from the Bloud by a kind of percolation in the Reins, after the same manner as when it is discharged in many places out of the Arteries into the Glandules to supply matter for tears, spittle, snot, and other excrements. But I am also of opinion that this is likewise performed in some sort by dissolving of the Bloud, which is in its own nature thick and apt to curdle, whilest it passes through the Reins, is very much dissolved and attenuated by the leyish ferment of this part; in so much that the serous liquor separates from it the

The Reins have a ferment in them.

more easily. For the Piss being impregnated with a Saltness, whilest it continually washes through the very streight passages of the Reins, affixes on them saline particles, and consequently infects them with a kind of leyish odour or tincture, with which when the bloud is influenced as it passes through those parts, it is kept from thickening, still fluid, and apt to divide into several parts by percolation; as in like manner Milk is preserved from curdling by throwing Salt of Tartar into it. Yea the bloud it self, though out of its Vessels, it presently uses to grow thick and curdle, yet if you pour into it a quantity of Salt of Tart or Sal Armoniack, it remains fluid. The ferment therefore in the Reins doth, as it is commonly supposed, precipitate the bloud, but keeps it in such a state as that it may it self the more freely circulate, and the *Serum* of it be separated in a due quantity by percolation. And indeed that the Reins are impregnated with such a leyish ferment, is sufficiently manifest from the flesh of them, when prepared for eating; in that it hath from thence a very rank and ungrateful smell and taste.

Part of the nutritive juice is carried away thorow the Reins with the Serum.

Whilest the *Serum* is separated on this manner in the Reins, partly by fusion and partly percolation, not only the bloudy part, but also most part of the nutritive juice too, escaping through the narrow pores of this same Strainer, is remanded with the bloud through the veins, whilest in the mean time the serous liquor it self, being impregnated with a saltness, not onely in the mass of bloud, but also by the ferment of the Reins, gleets down

through

through the Urinary pipes, or ſmall paſſages perpetually into the *Pelvis*, and waſheth away with it ſome of the more thin, and elaborate part of the nutritive juice, which is the ſediment of ſound Urine. *Phar. Rat.* Part I.

The matter of the Urine proceeds chiefly from the maſs of Bloud.

But indeed the Piſs or matter of the Urine, as to its ſubſtance, quantity and qualities, proceeds chiefly from the maſs of bloud. For ſince there are three chief and ſpecial offices which this performs (as I have elſewhere ſhewn) that is to ſay, by kindling or cauſing an heat to keep in the fire of life, by inſtilling the animal ſpirits into the Brain, and diſtributing the nutriment to all parts of the Body; for all and every of theſe purpoſes it muſt of neceſſity be diluted with a great deal of wateriſh humour, and likewiſe be moiſtened perpetually with it ſtill freſh and freſh, after it hath ſent away that which is ſtale; and that this be performed in a due and conſtant method is of great conſequence to the preſerving of health.

The Serum is ſeparated from the Bloud ſometimes with difficulty, and ſometimes too eaſily.

The freſh ſerous liquor is very eaſily introduced into the Bloud along with the nutritive juice, and is throughly mingled with it moſt commonly without any impediment; but the ſtale doth not part from it always ſo readily and rightly as it ſhould do; but there are many errours in the ſeparation of it, from whence many Diſeaſes are occaſioned. For the *Serum* ſometimes ſticks to the Bloud unſeaſonably, and cannot deliver it ſelf from the embraces thereof: as in Fevers, of which there is no judgment at all, or at leaſt but an ill one to be made, as alſo in a *Leucophlegmatia* or Dropſie cauſed by white phlegm and a *cacochymia* or depravation of the Humours. But ſometimes though it is expelled from the Bloud, it leaves the Reins (which is the natural way of voiding it) and goes another way; as in Catarrhs, Gouty or Scorbutick defluxions, and in all ſorts of Dropſies; and ſometimes too on the other hand, the *Serum* getting too ſoon out of the Bloud, runs away before it hath done its task or office, and ſucking in ſome portions of the humours that are more uſeful, carries them along with it; as in a *Diabetes*, and great diſcharges of Urine that ſometimes fall out, and preſently ceaſe again. In theſe caſes, that is to ſay, as often as the quantity of Urine is either defective or exceſſive, the Reins are not always, or chiefly, but the Brain, and the Bloud moſt of all uſes to be in the fault; in as much as the maſs thereof being ſometimes too ſtrict and compact doth not eaſily diſmiſs the *Serum* and other things therein contained, which ought to be evacuated, and being otherwhiles too looſe and apt to diſſolve, cannot contain or keep in the *Serum* and nutritive juice long enough. Now from what cauſes and operations ſuch Irregularities proceed, we will a little enquire.

The reaſon of it is beſt explained by the diſſolving, curdling and reducing of Milk.

And indeed to reſolve this doubt, the analogie or reſemblance of Milk to Bloud (which, becauſe I have explained more at large elſewhere, I will here but briefly touch upon) doth very much conduce. Of Milk you may obſerve, that as long as the mixture thereof is preſerved entire, though it boyls or bubbles up upon the fire, all its particles being promiſcuouſly mingled make up one uniform liquor; but if you drop into it, whileſt it is boyling, any thing that is acid, the thicker particles of it turn preſently into a groſſer curd, and the watery ones in the mean time are diſſolved, with many of the ſaline ones, into a thin and plentiful liquor. Beſides, it is a common ordinary obſervation, that if Milk that is kept ſo long till it grows ſowre, be boyled upon a fire, it curdles of its own accord without pouring of any acid matter into it. And on the contrary, if at any time Milk be impregnated with any Salt of a nature different from acid Salt, (as for example, fixed, nitrous, or volatile) that is firſt diſſolved in it, it is not at all curdled by an acid poured into it, when it is boyling upon the fire. For this I have often tried with Salt of Tartar and Wormwood, with Mineral Chryſtal, with Flower of Salt Armoniack, with Spirit of Hartshorn, and other things of the like kind. Moreover (which is ſtill a ſtranger thing) if you drop any of theſe Salts, or any diſſolution of them into the Milk whileſt it is a boyling upon the fire, and curdled by the acid matter that was infuſed into it, the curdling which was before, is for the moſt part diſſolved, the white thick and hard ſubſtance preſently vaniſhes, and the liquor is made thin and almoſt limpid again, though it does not totally reſume the form and homogeneous nature of Milk. And indeed that ſuch alterations as theſe do conſtantly happen, I have ſufficient knowledge by frequent experience; to wit, that if you put Ale, or White Wine, or Cider, or Vinegar, or any acid juices into Milk whileſt it is boyling upon the fire, it all preſently loſes the form of Milk, and turns to a white Curd and thin Whey. Then afterward, if you pour into the whole whileſt it is yet hot, either Salt of Tartar, of Wormwood, or any other Vegetable diſſolved, or the diſſolution of Salt of Nitre, or Armoniack (yea the Flowers or Spirits of it, as alſo of the Spirit of Hartshorn, Soot) and the like, and mixture be a little diſturbed, moſt of the thick part of it will diſſolve, ſave onely ſome few remaining ſmall portions, and little curdled bits, that will ſwim here and there upon the top of the liquor. Moreover on the

How to hinder the curdling of Milk.

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the other hand, if you throw fixed or nitrous Salt, or Flower or Spirit of Sal Armoniack, or Spirit of Hartshorn or Soot into boyling Milk, and then put Ale or White Wine, or Cider, or any other acid liquor into it, the Milk will not thereby dissolve or coagulate. How and from what causes these things happen and proceed, and what analogy or resemblance they bear to the dissolving or inseparability of the *Serum* in the mass of Bloud, I think it worth while here to consider.

The reason of these things is given.

From the Anatomy of Milk it plainly appears, that there are in it some few spirituous, a great many watersh, a pretty many sulphureous and earthy, and likewise some saline particles, which are partly volatile and partly fixed; whilest therefore the mixture is preserved entire, the saline particles sticking to the sulphureous ones, divide them from each other, and likewise hinder them from flying away, or uniting with the earthy ones; in the mean time the serous ones, being put in between the rest that are so equally mixed, fill up all the void spaces, and make the whole liquor as it were homogeneous: but whereas by the dropping in of the acid matter there happens presently a dissolution and coagulation of the liquor, the reason is, because the particles of fluid Salt in the acid matter catch hold of any other saline particles, whether fixed or volatile, in the Milk; to which, whilest they are fast united, the sulphureous particles getting out of the embraces of those that are acid and salt together, gather into one body, and so being united mutually among themselves, and with the earthy ones, they make up that thick curd that separates from the rest of the liquor: whilest in the mean time the watery Humor (in that its pores are almost quite destitute of sulphur and earth) being impregnated with little else besides the combinations of several Salts, grows presently thin and diluted. That it is really so, is very evident from the experiment just now cited, in as much as that curdling of the Milk is hindered, or taken off by the injection of fixed, nitrous, or volatile Salt: for every one of these Salts takes hold of the acid Salt which is in the Rennet that is infused, and by that means either preventeth or breaks off its union with the saline particles that are in the Milk: but whereas, though curdling of the Milk be taken off, yet its former hue is not restored to it, the reason is, because the extraneous particles of the Salts that are put into it, remaining still in the mixt body of it, do hinder the entire restoration of its mixture; but without doubt if those particles could be again expelled, or driven out, the former mixture would return as like Milk as before. Wherefore I may conjecture of the Bloud, that though it be sometimes depraved by fusion or coagulation, because it uses to exterminate or drive out from it all heterogeneous particles, may recover its due and former mixture.

But whereas Milk that is kept too long and grows sowre, is curdled of it self upon the fire without any acid matter infused into it, the reason is, because in that liquor, which then tends to putrefaction, the saline volatile particles (as is usual) being depressed to a fluidity, become acid; and therefore they (since the pores of the Milk are opened in the boyling) catch hold of the saline fixed particles that are allied to them; to which whilest the sulphureous ones that came out of them, stick fast and close, (being also mutually united among themselves, and likewise with the earthy ones) they make a white Curd whilest the *Serum* with the combinations of the Salts is dissolved into a watersh humour. Cold Milk will not curdle either of it self, nor if you put an acid into it; because when the pores are closed, the inward particles, however disposed, do not easily set themselves upon making either new unions or separations; but when the pores are opened by the heat, then as occasion is given, they presently make divisions and private combinations.

Having premised these things concerning the dissolution, coagulation, the prevention of that condition, and the reduction of it to its former state; let us now consider whether any thing like or analogous to what I have said, agree to the Bloud or no.

There is somewhat in the Bloud analogous to the curdling of the Bloud, &c.

Now truly though we cannot resolve, variously separate, or curdle the Bloud when taken out of the Vessels (and then reduce it to its former state again) by the affusion of saline matter, nor divide it into its constituent parts, as we can Milk upon the fire; because indeed the consistence of Bloud is thicker than that of Milk, and more apt to grow grumous [or into a Gelly] and also that when the vital flame of it is extinguished, that consistence is very much changed from what it hath in the Vessels; yet I have often tried and known (what the experience of others also doth confirm) that the same liquors that dissolve and precipitate Milk, as distilled Vinegar, Spirit of Vitriol, the dilution of Salt or Nitre, and other acids, when poured into hot Bloud, do presently curdle and discolour it, in such a manner, as that when the whole mass grew black, one part turn into a thick Cake like Gelly, and the other into a thin, watery *Serum* or Whey. So likewise those things that hinder or take off the curdling of Milk, as Oil of Tartar, the fixed Salts of Plants, the dissolution of the Salt of Nitre, or slacked Lime, Spirit of Sal Armoniack, of Harts horn, and the like, if poured into the Bloud when

What alterations Chymical Liquors poured into Bloud when it is hot, do produce.

when it is hot, preſerve its mixture entire, or rectifie it, as we may conclude from its ruddy bright colour, and the conſiſtence of it that remains ſo long and ſo even: ſo that it eaſily follows from hence, that Bloud conſiſts of the ſame elementary particles as Milk, though in a different proportion. For in the Bloud there is a greater quantity of Spirit, Sulphur, Salt, and Earth, and leſs Serum than there is in Milk. From whence we may conclude, that the Bloud when rightly diſpoſed, that is, the thicker ſort of it, is too apt to curdle or turn to a Gelly, but is not ſo liable to diſſolution, or being turned into many ſerous parcels; and yet, that whileſt it paſſes through the Reins in its circulation, all ſuperfluous wateriſhneſs is ſeparated and carried off from it, partly by the ſtrainer of the Reins, and partly by the ferment of them, which keeps the Bloud from too exceſſive coagulation. But when the Bloud is vitiated in its temper, there are many irregularities both in the conſtitution of it, and in the ſeparation of the *Serum*. As to the firſt, the Bloud ſometimes is too hot and ſharp, and otherwhiles too thick and fæculent or dreggy, as at other times alſo exceſſively thin and wateriſh; and according to theſe ſeveral degenerated conditions or ſtates of it, ſeveral Diſtempers do ariſe, of which it is not proper in this place particularly to treat. But howſoever the Bloud is diſordered in its temper, yet whileſt the *Serum* of it is ſeparated in its due meaſure and method, the Party is not therefore preſently very ſick upon it. But a great many Diſtempers happen to ſpring from the ill ſeparation of the *Serum*. And in this caſe, as there are many ſorts of errours, ſo moſt commonly the fault lies either in exceſs or defect. For ſometimes the ſerous Liquor ſticks too cloſe and faſt in the embraces of the Bloud, and on the contrary, ſometimes ſlips away too ſoon; and in this reſpect, the Bloud being not able to keep in the *Serum*, ſpews it out at the mouths of the Arteries in many places, almoſt all over the Body; and by that means diſcharging it into the Bowels, or the habit of the Body, produces an *Aſcites* [a Dropſie ſo called] or an *Anaſarca* [another kind of Dropſie] yea and ſometimes ſending it immoderately into the Reins, cauſes a *Diabetes*. The Bloud when it keeps in the *Serum*, too ſtrictly, either boyls up for the moſt part in a Fever, and is more compact in its conſtitution (whileſt the thicker particles at the ſame time are mixt, and contempered with it) ſo as that the thinner particles do not eaſily break forth; or being filled with ſcorbutick Salt and Sulphur, it becomes very clammy and glutinous, in ſo much that the ſerous parts can ſcarce get away out of the company of the reſt. Now ſeeing that the ſeparation of the ſerous Liquor is hindered or perverted ſo many ſeveral ways, there are alſo Diuretick Medicins of a different nature and operation; which yet may be diſtinguiſhed; and firſt of all, as to their end, as they reſpect the maſs of Bloud, or the Reins, or both together. Secondly, As to their Matter, as they are either ſulphureous or ſaline: and theſe again are very various, according as the ſaline particles are in a ſtate of fixedneſs, fluidity, or volatility, or otherwiſe, nitrous or Alchalized. Thirdly, As to their Form, theſe Medicins are very different; but moſt commonly the Compoſitions of them, as to their appearance, are either Potions, or Powders, or Boluſſes, or Pills, or Chymical Liquors, of which hereafter we will particularly diſcourſe. In the mean time, although it may ſeem that the explanation of the particular deſigns and ends of Diureticks belongs more to the ſpeculative than the practical part of Phyſick, yet I think it neceſſary in this place briefly to point out the chiefeſt of them. Then in the ſecond place, to diſtinguiſh Diuretick Medicins, as to their Matter, which in every one of them is moſt commonly ſaline onely. And in the laſt place, to ſubjoin the choiceſt Forms of Receipts in every kind.

That the Bloud may rightly ſeparate the Serum it ought to be kept from growing too thick or too thin.

The exceſſive ſeparation of the Serum.

The defective ſeparation of the Serum.

A diviſion of Diuretick Medicins,
1. *As to their End.*
2. *Their matter.*
3. *Their Form.*

First therefore, when the Bloud becomes ſo thick and clammy through the mixture and mutual combination of fixed Salt with Sulphur and Earth together, that the watery particles cannot eaſily part from the reſt, the Diureticks, to looſen its conſtitution and diſſolve the *Serum*, ought to be ſuch as are full of volatile or acid Salt: for ſuch particles chiefly diſſolve the Combinations made by the fixed Salt. But ſeeing this diſpoſition is common both to the Fever and the Scurvy, in the former caſe the moſt proper Diureticks are not onely the temperate acids of Vegetables, as alſo Salt of Nitre, Spirit of Sea Salt, Vitriol, &c. but alſo ſuch as are impregnated with volatile Salt, as Spirit of Harts horn, and of Sal Armoniack, Salt of Amber, of Vipers, and others of the ſame kind; which we have hereafter recounted in the number of Diaphoreticks alſo. In the Scurvy, ſeeing the Urin is but little, and that thick too, the juices of Herbs, and Preparations, both acid and ſharp, are of great uſe; as alſo Sal and Spirit of Piſs, of Sal Armoniack, of Tartar, &c.

1. *Saline Diureticks:*
1. *Such as agree beſt when the Bloud is too compact.*

Secondly, Sometimes the Bloud doth not keep the *Serum* within it long enough, but being obnoxious either to fluxions, or rather coagulations, diſchargeth it here and there in very great quantities, and cauſes Catarrhs, or Tumors in ſeveral places; or the Bloud being habitually weak, and at the ſame time of an ill temper, that is inclining

And 2. *what agree beſt when it is too looſe.*

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ning to acidity, is apt, as to its thicker particles, to curdle; in so much that the thinner parts of it being sent away, whilest it circulates, and settling in the weaker parts, produce sometimes pains in the head or breast, and sometimes an *Ascites* or *Anasarca* [two sorts of Dropsies]. Moreover from the like cause I shall by and by shew that a *Diabetes* proceeds. For indeed many obstinate Diseases that are imputed to the ill temperament of the Bowels, arise from this cause; to wit, for that the Bloud being of an ill temper and liable to coagulation, seeing it cannot continue the whole motion of its circulation, doth in many places discharge and leave the *Serum* which is too apt of it self to separate, and lodge where it should not. In these cases such Diureticks are to be given that may not dissolve the Bloud, but take off its coagulation onely; such as are Medicins impregnated with fixed, volatile or even alchalized Salt; and likewise such as corroborate and restore the ferment of the Reins, as some sulphureous and spirituous ones. To these ends serve Diureticks that are sulphureous and mixed, lixivial or leyish Salts of Herbs, Powders of Shells, Sal and Spirit of Pis, &c. Millipedes [or Woodlice] Roots of Horse-radish, Parsley Seeds, Nutmeg, Turpentine and the Preparations of it, and Spirit of Wine; the virtue of all which, is not to dissolve the Bloud, and precipitate serous matter out of the mass thereof (for that acids do best, and in such cases often hinder the flowing of the Urin) but to dissolve the curdling of the Bloud: so that the constitution of it having recovered its entire mixture, and circulating more swiftly through the Vessels, may suck back the *Serum* that is any where extravasated [*i. e.* out of its Vessels] or lodged where it ought not to be, and may at last deliver it to the Reins to be by them carried off. How Diureticks of all kinds work according to both these, almost opposite ends of Physick, and under what Forms they are most commonly prescribed, I shall now in the next place shew you.

CHAP. II.

The sorts and forms of Diureticks [or Medicins that purge by Urin] as also the Reasons of the Chymical Preparations of some of them.

The diverse states of Salts.

Their various affections.

FIrst therefore, as to Saline Diureticks [or salt Medicins that purge by Urine] that which I have oftentimes inculcated, ought to be here taken notice of, to wit, that what ever Salts of different tempers are put together, they mutually lay hold of each other, and are immediately conjoined; and that whilest they so combine, the other particles, being loosened from the mixture, divide or fly several ways. This is evidently seen when fluid or acid Salt is put to fixed or alchalized; and likewise when fluid or fixed is mixed with volatile or sharp Salt. Indeed the whole business of Dissolutions and Precipitations depends upon this one quality of Salts. Wherefore since the Bloud and Humours of our Bodies abounds with much Salt, and that usually altered from one state to another, and consequently the cause of various indispositions; and seeing furthermore that there are divers kinds of saline Diureticks, filled with fixed, fluid, nitrous, volatile, or alchalized Salt, it will require great discretion and judgment in a Physician so to order it, that the saline particles in the Medicin may differ from those in our Bodies. How this may be done I will shew you by running over each kind of saline Diureticks.

Diureticks impregnated with acid Salt.

Where they are agreeable.

Among saline Diureticks impregnated with acid Salt, the Spirit of Salt or Nitre, as also the juice of Limons, and Wood Sorrel, White Wine, Rhenish Wine and Cider are of prime note among the Vulgar, and oftentimes perform that intention: for these alone dissolve the Bloud, and precipitate it into *Serum*, as when an acid is dropped into boyling Milk. But this doth not happen alike in all, nor even to any equally. In an hale constitution, or such as is not much different from it, the Salt of the Bloud is partly fixed, partly nitrous, and partly volatile; so also in some Scorbutick and Hydropical Bodies, it becomes most commonly fixed. Wherefore in every of these cases, Diureticks impregnated with acid Salt, are used with success; but in Catarrhs, and some hydropical and scorbutical Distempers, when the saline-fixed particles of the Bloud are exalted into a state of fluidity, and the volatile ones are depressed (as it often happens) acid Remedies usually do more hurt than good; in as much as they more pervert the Bloud, that is already degenerated from their right temper: but in such cases, Medicins impregnated with fixed or volatile Salt will be more helpful.

The

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The Forms of Diureticks that have acid Salt for their Foundation.

Powders.

Take of the Powder of choice white Tartar, of Chrystal Mineral, each ʒ j. ß. *of Crabs eyes pulverized* ʒ j. *and make a Powder. The Dose is from* ʒ ß. *to* ℈ ij. *in a convenient vehicle, repeating it every sixth or eighth hour.*

Take of Tartar vitriolated, or nitrated ʒ ij. *of the Powder of Egg-shells* ʒ j. ß. *of Parsley or wild Carret seed* ʒ ß. *and make a Powder. The Dose is* ʒ ß. *to be taken in the same manner.*

Take of the best Spirit of Salt ʒ ij. *of Harts horn burnt and pulverized, a convenient quantity as much as will imbibe the Spirit, and make a Powder. The Dose is from* ℈ j. *to* ʒ ß.

A Drink.

Take of the juice of Limons ℥ ij. *of compound Radish Water* ʒ j. ß. *of Syrup of the five Roots* ʒ ij. *and make a Drink or Potion.*

Take of the juice of Sorrel ʒ ij. *of White Wine* ℥ vj. *mingle them and make a Potion.*

Take of compound Radish Water ℥ ij. *of Pellitory of the Wall* ℥ iv. *of Spirit of Salt* ℈ j. xv. drops, *of Salt of Tartar* gr. xv. *of Syrup of Violets* ℥ ß. *and make a Potion.*

Diuretick impregnated with fixed Salt.

2. That Medicins impregnated with fixed or lixivial Salt, provoke Urin, is very manifest from the vulgar and quack Physick that is commonly used to cure Dropsies; for in an *Anasarca* [or Dropsie that goes through the habit of the Body] and sometimes in an *Ascites* [a Dropsie that makes the Belly swell like a Bottle] when the Bowels or Flesh are exceßively swelled with a conflux of Water, they frequently give a *Lixivium* or Lie, made of the ashes of Wormwood, or Broom, or Bean-stalks, with White Wine: from whence commonly proceeds plentiful pissing, by which the Distemper is removed. But yet I have observed, that that Medicin in some People hath not been at all Diuretick, but hath increased rather than cured the dropsical indisposition: of which if you would know the reason, it is manifest from what I have already said, that lixivial Salts do neither dissolve nor precipitate neither the Bloud nor Milk, and therefore are not in their own nature diuretick; but yet that effect sometimes follows, in as much as the fixed Salt, being copiously taken in, destroys the operation of the acid and coagulative or curdling Salt that predominates in the Bloud; and consequently the Bloud, though before it were too apt to be dissolved, and could not contain its *Serum*, but thrust it forth in all places, yet now by the approach of the fixed Salt, recovers it due temper, and therefore sucking back the *Serum* that was extravasated, and carrying it down to the Reins, it causes plentiful pissing.

Their Forms or Receipts.

2. Forms or Receipts of Diureticks that have fixed Salt for their Foundation.

Take of the Salt of Tartar or Wormwood ʒ ij. *of Coral calcined till it be white* ʒ j. ß. *of Nutmeg* ʒ ß. *make a Powder. The Dose is* ʒ ß. *to* ℈ ij.

Take of the Tincture of Salt of Tartar ʒ j. *to* ʒ j. ß. *of compound Radish Water* ℥ j. ß. *mingle them, and give it in a draught of Posset drink, with Roots and Seeds of Burdock boyled in it.*

Take of the Deliquium [*or Oil*] *of Salt of Tart, that floats beneath, whilest the Tincture is extracting, and of Wine impregnated with Sulphur* ℈ ij. *to* ʒ j. ß. *of White Wine* ℥ iv. *to* vj. *of Syrup of the five Roots* ℥ ß. *mingle them, and make a draught, to be repeated twice or thrice a day.*

Take of the whitest ashes of Vine twigs half a Pint, of Nutmeg ʒ ij. *pour to it of White or Rhenish Wine two Pints and an half. Let them stand hot and close for a day, and then keep the straining for your use. The Dose is* ℥ vj. *twice or thrice a day.*

Take Flints heated red hot in the fire, and quench them in White Wine or old March Beer, and drink of that Liquor ℥ vj. *or* viij. *twice a day.*

Take of slacked Lime water ℥ iv. *to* vj. *of the Tincture of Salt of Tartar* ʒ j. *to* ʒ j. ß. *make a draught, to be taken twice or thrice a day.*

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Diureticks impregnated with volatile Salt. Why they do good.

3. For the ſame reaſon that fixed Salt is uſed, in a ſharp indiſpoſition of the Bloud, to provoke Urin, they uſe alſo volatile Salt ſometime, and that with ſucceſs; in as much as the particles thereof being admitted into the Bloud deſtroy the predominancy of the fluid Salt that is in it; and conſequently the Bloud, recovering its due mixture, and being freed from curdling and defluxions, ſucks back all the *Serum* that is extravaſated and delivers over to the Reins all that is ſuperfluous to be carried off through the Ureters or Piſs-veſſels. But yet thoſe Medicins which are prepared with volatile Salt, (becauſe they have particles that are ſomewhat ſtrong and elaſtical or ſprindgy) when they mend or rectifie the temper of the Bloud, diſpoſe that part of the *Serum*, that is ſuperfluous, for evacuation by Sweating ſometimes as well as by Piſſing. Now to this rank of Diureticks, not onely pure and ſheer volatile Salt, drawn out of Animals or Minerals by Diſtillation, but even the integral parts both of living and vegetable creatures (ſuch as the Powders and Extracts of Inſects and Vegetables that are ſharp) ought to be referred.

3. Forms or Receipts of Medicins that have Volatile Salt for their Foundation.

Powders. *Take of the ſalt of Amber, and of ſalt of Nitre, each* ℥ ij. *make a Powder. The Doſe is* ℈ j. *to* ℥ ß. *in a convenient vehicle.*

Take of the Flower of Sal Armoniack, and of Mineral Chryſtal, each ʒ ij. *and mingle them. The Doſe is* ℈ j. *to* ʒ ß. *in a ſpoonful of compound Radiſh water. Give the Salt of Urin after the ſame manner.*

Take of the Powder of Bees ℈ j. *of Lovage ſeeds* ℈ ß. *make a Powder, and give it in a ſpoonful of diſtilled Water.*

Potions. *Take of the ſpirit of Urin from* ℈ j. *to* ʒ ß. *of compound Radiſh water from* ℨ j. *to* ℨ j. ß. *of Juniper water* ʒ iij. *mingle them and make a Potion. You may give the ſpirit of Tartar after the ſame manner in a double quantity.*

Pills. *Take of Millepeds prepared* ʒ ij. *of the Flower of Sal Armoniack* ʒ ß. *of Nutmegs pulverized* ʒ ß. *of Venice Turpentine a convenient quantity, and make them into Pills. Let the Patient take* iv. *twice a day.*

Take of the Powder of the Seeds of Burdock ʒ ij. *of wild Carret* ʒ j. *of the ſalt of Amber* ʒ j. *of Oil of Nutmegs* ℈ ß. *of Capivy Balſam a convenient quantity. Make a Maſs and form it into ſmall Pills, of which you may give* iv. *night and morning.*

A Decoction. *Take of the Roots of Chervil, Parſley, Fennel, Ringo, and Reſtharrow, each* ℨ j. *of the Leaves of Saxifrage and Clivers, each one handful, of the Seeds of Hartwort and Grumwel each half an handful, of Juniper berries* ʒ vj. *boyl them in* iv. *Pints of Spring water till half be boyled away, and then put to it one pint of Rheniſh Wine, and of the beſt Honey* ℥ ij., *and ſo make an Apozeme or Decoction. The Doſe is* ʒ vj. *twice a day.*

A diſtilled water. *Take of freſh Millepeds two pints, of the Leaves of Clivers, Chervil, Saxifrage, and of Golden Rod, each two handfuls,, of wild Radiſh roots* ʒ vj. *of Nutmeg* ʒ j. *of Juniper berries, of Seeds of wild Carret, each* ℥ ij. *cut them to pieces, bruiſe them and pour to them of Whey, made with White Wine* viij. *pints, diſtil them in the common veſſels and mingle all the liquor. The Doſe is* ℥ iv. *twice or thrice a day.*

Strainings. *Take of freſh Millepeds waſhed, from the number of* 40. *to* 60. *of Nutmeg* ℈ ß. *which when you have bruiſed, pour to them of the diſtilled water of Saxifrage* ℨ iij. *Strain it and drink it.*

Take of the Leaves of Chervil, and Parſley of Macedonia, each three handfuls: bruiſe them, and pour to them of White Wine a pint and an half; then ſtrain it well, and keep it in a glaſſen Veſſel. The Doſe is ʒ iij. *twice a day.*

A Tincture. *Prepare a Tincture out of Millipeds, Bees, Graſhoppers or dried Catharides, with the Tincture of the ſalt of Tartar. You may give it from* 15 *or* 20 *drops to* 30, *in a convenient vehicle.*

4. That

4. That Nitre is a kind of Salt, is very manifeſt from the figure, colour, taſte, with other properties and accidents belonging to it. But yet this is different from all other ſorts of Salt, or any ſtate of ſaline particles, nor is it either acid, or fixed, or volatile, but as it were a mean betwixt both. It ſo far participates of volatile Salt, as that when it is made, it ought to be elixiviated, or prepared with a Lie, and joined to fixed Salt, that it may thereby gain a kind of concretion or bulkineſs. Moreover, When it is melted, if you put any Sulphur into it, it immediately takes fire and flies away: but it ſo far communicates with fixed Salt, that being melted in a crucible, it indures a long, and it may be, perpetual fuſion, without any conſiderable diminution of its parts or particles. Indeed it is Nitre onely, whereby all Plants flouriſh, all Animals live and breath, and wherewith all ſublunary fire is kindled and fomented or kept in; as I have ſhewed in another Treatiſe, which I have no neceſſity here to repeat. *Phar. Rat:* Part I. *Diuretick's that are impregnated with a nitrous Salt.*

But as to what concerns our preſent buſineſs, it is ſufficiently known, that the Salt of Nitre cools the Bloud, and provokes Urin very ſtrongly: but the reaſon of both theſe effects is not ſo very evident: for Nitre is ſo far from containing in it ſuch cooling particles, that on the contrary, nothing is more fiery, as you may ſee in Gunpowder; and if you diſtil it, you would think a flame rather than a vapour or fume came forth into the Receiver: Beſides that, the *ſtagma* or diſtilled liquor that drops from it, burns and corrodes all things that come near it, juſt like to actual fire. Nor have we leſs reaſon to wonder how this Body, whoſe nature is ſo exceeding fiery, ſhould ſo dilute the bloud, and diſſolve or melt it into wateriſhneſs in order to provoke Urin. *The reaſons of its effects.*

Upon theſe things, that I may give you my conjectures, I ſay, that Nitre conduces to the production of thoſe effects in a double reſpect; to wit, both as it is a Salt, ſomewhat allied to fixed and volatile Salt, and alſo as it is a fiery body. As to the former, I have obſerved that Nitre (like fixed and volatile Salts) being put into Milk, doth either hinder or take off the curdling of it; and likewiſe that if you pour Bloud whileſt it is hot, upon this, as you do upon thoſe it will preſerve it from curdling or being diſcouloured. Wherefore ſeeing the particles of Nitre taken inwardly, do either keep the mixture of the Bloud entire or reſtore it, they conſequently will prevent or take off the meltings or curdlings thereof, from whence proceeds heat and difficulty of making water.

But furthermore Nitre, as it is a fiery body, if inwardly taken, will cool the Bloud when it is in an exceſſive heat, and provokes Urin; in as much as (which I intimated before) it augments, by coming in, the flame of the Bloud, which before was dim and mixed with ſmoakineſs, and making it more clear and pure, doth conſequently render it more gentle; and when by that means the Bloud (whileſt it burns more bright through the intermixture of the Nitre) is more looſened in its conſtitution, the ſerous particles are more eaſily extricated, or diſengaged from the thicker, and do more plentifully run away.

4. Receipts of Diureticks, that have Nitre for their foundation.

Take of Nitre prepared ℥ ij. *of Barley water, with the roots of Graſs and candid Ringo boyled in it, two Pints, of Syrup of Violets* ℥ ij. *mingle them. The Doſe is* ℥ iv. *twice a day.*

Take of Sal Prunella ℥ ij. *of white Sugar* ℥ j. *make a Powder, to be divided into ſix parts, whereof take one in any convenient liquor, thrice a day.* *Powders.*

Take of Sal Prunella ʒ iij. *of Salt of Amber* ʒ j. *and make a Powder. The Doſe is* ʒ ß. *thrice a day.*

Take of Sal Prunella, of Crabs Eyes, and of Salt of Wormwood, each ʒ ij. *mingle them The Doſe is* ʒ ß. *thrice a day.*

5. It is alſo very vulgarly known that ſome Powders of Shells and Stones, that are impregnated with an alchalized or petrifying Salt, do ſometimes provoke Urin. For to ſome that have been troubled with great Stranguries, or difficulty of Piſſing, the Powder of Egg ſhells, and of the Claws or Eyes of Crabs, hath been a preſent remedy. Of which if you inquire into the manner and reaſon of their operation, it is very manifeſt that ſuch Medicins do not diſſolve or ſenſibly precipitate the Bloud. Wherefore we muſt conclude, that theſe are ſometimes (upon a ſowre indiſpoſition of the Bloud and Humours) diuretical, or apt to provoke Piſs, in as much as they by *Diureticks impregnated with alchalized Salt:*

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their combination or ſticking together do bind and reſtrain the acid Salts, ſo that the Bloud, being freed from all fluxions and coagulations, ſucks back the extravaſated *Serum*, and tranſmits it to the Reins.

Their Forms or Receipts.

5. Receipts of Diuretick Medicins, that have Alchalized Salt for their foundation.

Take of the ſhells of Eggs powdered ʒß. to ʒj. *give it in a draught of White Wine, or Poſſet drink, or Diuretick Decoction, twice a day.*

Take of the Powder of the Claws or Eyes of Crabs ʒij. *of Salt of Amber, and of Nitre, each* ʒj. *of Nutmeg* ʒß. *make a Powder. The Doſe is* ʒß. *to* ℈ij. *in a convenient vehicle. Or take the aforeſaid Powder with a convenient quantity of Venice Turpentine, and make it into ſmall Pills. The Doſe is* iij, *or* iv. *night and morning.*

Diureticks that are ſulphureous and ſpirituous.

You may juſtly reckon among ſuch things as are Diuretical, not onely ſaline Bodies, but alſo ſome ſulphureous and ſpirituous ones too, in as much as they often produce the ſame effect. Many Gums, as eſpecially Turpentine, (and ſuch Medicins as are prepared out of them) Oils of Juniper, Nutmeg, Wax, and that which drops from other fat things, being taken inwardly, provoke Urin (in many People) very plentifully, which hath a ſmell like that of Violets. I have known in ſome hydropical and ſcorbutical perſons, that the ſpirit of Wine, and hot Waters, yea and generous Wine alſo, if largely drunk of, hath provoked Urin; of all which the reaſon is, becauſe when the Bloud is weak or ſowriſh, or, through the defect of fermentation, or the predominance of an acid and coagulating Salt, doth not circulate ſo briskly and equally as it ſhould do, ſo as to contain the ſuperfluous *Serum* within it, till it can deliver it over to the Reins, the aforeſaid Remedies (in as much as preſerve the mixture of the Bloud entire, or reſtore it when decaying) conduce very much to the provoking of Urin.

Their Receipts. Diſtilled water.

Take of the freſh Berries of Ivy, Juniper, and Laurel, each half a pound, of the Seeds of wild Carret ʒiv. *of Nutmeg* ʒij. *After you have bruiſed them, put to them in a Glaſſen Retort, of the beſt Venice Turpentine one pint, of Spirit of Wine rectified four pints, diſtil them in an Oven of Sand with a moderate heat till they are dry, taking care that they burn not, and you will have a Spirit and an yellow Oil, which are both exceedingly Diuretick. The Doſe of the Spirit is from* ʒj. *to* ʒij. *or* iv. *of the Oil* ℈ß. *to* ℈j. *in a convenieut vehicle.*

A Tincture.

To the dregs that are left behind in the Retort, pour of the Tincture of Salt of Tartar one pint; and let them digeſt cloſe in an Oven of Sand for ſeveral days, that the red Tincture may come forth; of which the doſe is from ℈j. *to* ℈ij. *or* ʒj. *in a convenient vehicle.*

A Spirit and an Oil.

Take of prepared Millepeds ʒiij. *of Nutmeg* ʒj. *bruiſe them, and pour to them of the pureſt ſpirit of Turpentine, and of the Tincture of Salt of Tartar, each* ʒ vj. *diſtil them with the gentle heat of a Bath, and you will have a Spirit, an Oil, and the deliquium or melting of the ſalt of Tartar, each of them impregnated with a notable diuretick quality.*

The Reaſons of ſome Preparations.

1. *Sal Prunellæ, or Chryſtal Mineral, which is nothing elſe but purified Nitre.*

Sal Prunellæ.

Take of choice Nitre a convenient quantity, and diſſolve it in Spring or Rain water; boyl it a little, and lay it up in a deep glaſſen Veſſel, to chryſtallize, in a cold place: then pick out the whiteſt and moſt clear chryſtals onely, which you muſt again by often diſſolutions and chryſtallizations, reduce to the higheſt degree of purity; and they after that, being melted in a crucible and poured out into a ſilver Veſſel, will harden into very white ſtone. Of this, when pulverized, the Doſe is from ℈j. *to* ʒß. *or* ℈ij. *which cools the boyling of the Bloud, and provokes Urin.*

The reaſon of it.

This Preparation is ſo ordered, that the nitrous particles, as much as is poſſible, may be ſeparated quite and clean from the fixed Salt, and harden into Chryſtals diſtinct by themſelves: for when the Nitre is firſt made out of the Earth, and drawn forth by a Lie, the particles thereof are ſo unapt to grow together, or chryſtallize, that

it

it is neceſſary for the nitrous Lie to be again elixiviated with aſhes, and impregnated with fixed Salt, to the end that the nitrous particles, being partly united to the Leyiſh ones, and partly, by the intervening of them, thruſt out of the pores of the Water, may gain a kind of concretion or hardneſs: wherefore ſeeing the Body or Salt of Nitre is formed in that manner, ſee that the particles of fixed Salt be, by frequent diſſolutions and chryſtallizations, purged away, as much as poſſible, to make it the purer for Phyſical uſes.

2. Spirit of Nitre.

Spirit of Nitre.

Take of the pureſt Nitre ℔ j. *of Powder of Bricks* ℔ ij. *which when you have well pounded and mixed, put them into a glaſſen Retort, luted or into an earthen one, and diſtil them in a reverberating Oven with a fire gradually augmented. The red Fumes will make the Receiver glitter with a kind of flame colour, and when they are condenſed will make a diſtilled liquor which is acid and exceeding corroſive. The Doſe is* iv. *to* vj. *in a convenient vehicle.*

The reaſon of it.

Although Nitre, mixed with Sulphur, is ſoon ſet on fire by the leaſt particle of igneous matter, and breaks out into flames; yet, being deſtitute of that, it may be melted in a crucible, or diſtilled in a Retort, without any burning at all. The Powder of Bricks is added to it, that when the Salts are melted by the fire, they may not mutually get hold of, and chain together each other, but being divided and ſeparated from one another, may, by the force of the fire, be driven forth from their ſubject.

Nitre, when melted, retaineth its inflamable quality; but the diſtilled liquor will ſooner put fire out than kindle it. For if at any time you put it among ſulphur, that mixture can very hardly, and not ſo ſoon as ſulphur, be kindled by it ſelf; the reaſon of which is, becauſe the nitrous Salt, having undergone a diſſolution, is quite altered from its natural ſtate, and gaineth much ſuch another ſowre temper, as other Salts that have ſuffered the like mutation; yea out of Sulphur there is drawn an acid *ſtagma* or liquor, that rather deſtroys than augments inflammations.

3. Spirit of Sea Salt.

Spirit of Sea Salt.

Take of Sea Salt, diſſolved and powdered, ℔ j. *of Bricks coarſly pulverized* ℔ iij. *pound them together, and mix them: then put to them ſome good big Brick-bats to the quantity of* ℔ ſ. *when they are well mixt and put into a ſtrong Retort, diſtil them with a fierce reverberating fire for* 24. *hours; rectifie the diſtilled liquor with the heat of Sand in a glaſſen Cucurbit, drawing off the phlegm or wateriſh part; and there will remain in the bottom a Spirit, of an yellow or greeniſh colour, that hath a ſmell and taſte very grateful.*

The reaſon of it.

This Salt is very difficult to be driven or forced into a ſharp liquor, becauſe the particles thereof, more than any other ſaline ones that are in Minerals, to wit, in Vitriol, Nitre, Alum, *&c.* being moſt ſtrictly united, cannot eaſily be parted from each other, or ſeparated from the embraces of the Earth; wherefore when they are looſened by the fire, mingle with them the Powder of Bricks, in a threefold quantity, to keep them from running together; and beſides that, I thought fit to put between them good big pieces of Bricks, that the maſs that is to be diſtilled, being hollowed as it were with holes through it, might be every where penetrated or pierced by the fire. Yet notwithſtanding, as you diſtil them, the Salts being diſſolved by the fire, will very often run together, in ſo much that afterward that cannot be driven forth with any force of fire.

A more compendious way.

That it is ſo, is very plain, becauſe if by Art this union of the Salts among themſeves and with the Earth be broken off, they are eaſily forced into an acid *ſtagma*, or diſtilled liquor. For example;

Take of the Spirit of Vitriol not rectified one pint, and in a glaſſen Retort, pour it into Sea Salt calcined and pulverized, and immediately diſtil it in Sand, the ſpirit of the Salt being expelled as it were by the other, will eaſily aſcend, whileſt the ſpirit of Vitriol ſtays in its room; that is, this ſpirit of Vitriol being more ponderous and ſtronger, and likewiſe bereft and covetous of an earthy habitation, drives the other out of its poſſeſſions, and at the ſame time invades them it ſelf.

4. Spirit of Piſs.

Take of the Piſs of a ſound man that drinks Wine, what quantity you think fit, and when you

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you have put it into a Cucurbit with a blind Still, let it rot in dung for a moneth; then diſtil it in Sand. The liquor diſtilled from it being rectified in a deep Cucurbit, affords a ſpirit and a volatile Salt.

This operation may be performed more compendiouſly, if you evaporate freſh Urin to a fourth part of what you firſt took, to wit, that when the phlegm is exhaled, the ſaline particles may more cloſely incorporate with the ſulphureous and earthy ones. To this thick compoſition (after you have put it into the Cucurbit) pour either a Lie made of Aſhes or Salt of Tartar, or the diſſolution of ſlacked Lime; and then putting on the Still, diſtil it in an Oven of Sand; and you will eaſily gain a Spirit, and a volatile Salt, which by rectification are purified and ſeparated.

The reaſon of it. The reaſon of theſe proceedings is, becauſe in that the Urin conſiſts of a double kind ef Salt, that is to ſay, a nitrous and a volatile, together with a great deal of Sulphur and Earth, the particles of volatile Salt (whileſt the mixture remains entire) are ſo detained and ſtrictly compacted by the other ſaline ones, together with the reſt of the thicker elements, that the ſpirits cannot break forth, or be divided and ſeparated by the force of fire; but when by long rotting [in the dung] the mixtion of the liquor is looſened, the ſaline volatile particles, which at length do extricate or diſentangle themſelves from the reſt, aſcend firſt in the diſtillation. Moreover the ſame effect alſo doth eaſily enſue, when a fixed Salt that is different from the nitrous, is poured in; for whileſt the particles of the nitrous Salt are laid hold on by thoſe of the other Salt that is infuſed, the volatile Salt eſcaping out of its reſtraint, doth eaſily make its way and is gone. Hither you may refer what I ſhall hereafter ſay of the diſtillation of Sal Armoniack.

5. Tincture of Salt of Tartar.

Tincture of Tartar. *Take of the pureſt Salt of Tartar* ℥ vj. *melt it and let it remain in the crucible till it gain a blew, or almoſt a green colour; then, having pulverized it whileſt it grows hot, and put it into a ſtrong Matrace or Glaſs Still with a long neck, pour to it rectified ſpirit of Wine the depth of three or four fingers, and let it digeſt in an* Oven *of Sand upon a quick fire for ſeveral days, till the tincture be extracted. For by long digeſtion the ſpirit of Wine gains a ruddy colour, in as much as the particles of fixed Salt, being in ſome meaſure exalted, are united to the vinous ſulphur. In the mean while the remaining ſalt of Tartar, which is diluted with the phlegm of the Wine, ſinking down into Deliquium or Oil, and floating by it ſelf will ſeparate below; which is much better than the common Oil of Tartar, in that it participates of the vinous ſulphur; and in ſome caſes, where there is a neceſſity for a lixivial Diuretick, it is a very good Medicin. The Doſe is* ℈ j. *to* ℈ ij. *or* ʒ j. *The Tincture is given from* ʒ j. *to* ʒ j. ß. *or* ʒ ij.

The reaſon of it The tincture of Salt of Tartar, by reaſon of the union of the vinous ſalt and ſulphur, hath a very grateful ſmell and taſte. If you diſtil the liquor to an half, the remaining part will retain in it more ſalt and ſulphur, but little of the vinous ſpirit; and the ſpirit which is drawn off and poured to freſh ſalt of Tartar, if it be digeſted, will hardly gain a Tincture, in as much as it is void of ſulphur to unite with the ſalt.

Now indeed, that in the ſpirit of Wine, the ſulphureous part is diſtinct from the pirituous, I learned from this Experiment.

Sulphur or Oil of wine. *Take of the ſharpeſt ſpirit of Vitriol half a pint, of ſpirit of Wine rectified, one pint; mingle them in a glaſſen Retort and diſtil them in an Oven of ſand, till the liquor (which at firſt ſeems homogeneous or of one nature) being drawn off, a deal of thick ſediment remains in the bottom: pour this ſpirit again to the* caput mortuum, *and ſo repeat the diſtillation with freſh matter two or three times; at laſt you ſhall have two diſtinct, unmingleable liquors; to wit, one acid-ſpiritous that ſinks downward, and the other very clear and oily that ſwims on the top; which, without doubt is the pure and mere ſulphureous part of the Wine, ſeparated by it ſelf, whileſt the ſpirituous part joins with the acid ſalt.*

6. Salt of Amber.

Salt of Amber *Take of the whiteſt Amber, pulverized* ℔ ß. *diſtil it in a glaſſen Retort either with a very ſtrong heat of ſand, or a weak heat of a reverberating* Oven; *firſt there will ariſe a phlegm and an yellow* Oil *with ſome quantity of ſpirit; then a volatile ſalt will*

will aſcend into the neck of the Retort and ſides of the Receiver; and laſt of all a black Oil will come forth before it aſcends: this muſt be taken out and the Receiver changed, leſt the Salt ſhould be polluted by it. *Phar.* Part I.

This Salt being at firſt white, and of a very grateful ſmell and taſte, unleſs it be kept in a veſſel very faſt ſtopped, becomes in a ſhort time yellow, and then grows red and ſtinks. The cauſe of which is, becauſe this Medicin contains in it much ſulphur; the particles whereof, as long as the ſalt predominates, being ſubdued and clogged with others, are altogether obſcured; yet afterward, when the compoſition of the mixed body is looſened, they get out, and ſhewing themſelves above the reſt, demonſtrate their excellency to ſeveral of our ſenſes. The Doſe of it is from ℈ß. to ℈j. The beſt way of keeping or giving this Salt of Amber is, if it be mingled with a double quantity of the pureſt Nitre. *The reaſon of it.*

CHAP. III.

Of exceſſive Piſſing, and the Remedy for it; particularly of the Diabetes [*or Piſſing Diſeaſe*] *into the Theory and Cure of which we here inquire.*

THe *Diabetes* was a Diſeaſe ſo rare among the Ancients, that many famous Phyſicians have not ſo much as mentioned it, and *Galen* never knew above two that were troubled with it; but in our Age, that is given ſo much to drinking, and eſpecially to guzzling of ſtrong Wine, we meet with very frequent, not to ſay daily examples and inſtances of this Diſtemper. But though it be familiar, and in its appearance well known among us, yet what are the cauſes and the true nature of it, we are almoſt wholly to ſeek. Upon which, that I may venture to philoſophize, or rather, give you my opinion, in the firſt place I ſhall lay down the deſcription of this Diſtemper in all its circumſtances, or the principal *phænomena* [or appearances] of it; and then I ſhall endeavour to find out, from what vitiated part or humour all thoſe ariſe. *The Diabetes was formerly rare, and is not yet well known.*

The *Diabetes*, ſo called from Διαβαίνω [*Diabaino*] *tranſeo* [to paſs through] is ſaid to be a ſwift paſſing of the potulent matter [or drink] or a great flux of Urin. Such as are troubled with this Diſtemper, piſs much more than they drink or take of liquid nutriment; and likewiſe they have a continual thirſt, a lingring Fever, and as it were an Hectick always upon them. But as to what ſeveral Authors ſay, that the Drink is little or nothing changed, there is no truth in their aſſertion: becauſe in all People (that I ever happened to know, and I believe it to be ſo in all) their Urin was very different not onely from the Drink that they took in, but alſo from any other humours that are uſually generated in our Bodies, being exceedingly ſweet, as if there had been Sugar or Honey in it. The occaſion of the aforeſaid errour (I ſuppoſe) was from the colour of the Urin, which always looks crude and wateriſh, as in thoſe that are troubled with the Green-ſickneſs or Dropſie. To find out the reaſons of theſe ſymptoms, let us enquire firſt, why the Urin is voided ſo copiouſly and ſo quickly, and then proceed to the remaining cauſes of this Diſtemper. *The deſcription of it.*

Whereas ſome aſſign, for the cauſe of a *Diabetes*, the attractive quality of the Reins, I do not like their reaſon; for the Bloud is not attracted to the Reins, but is driven thither by the motion of the heart. Nay farther, Neither doth the *Serum* ſeem to be drawn out of the Bloud whileſt it runs through them, or to be, as it were, milked out, but to be ſeparated partly by percolation, and partly by a kind of fuſion or precipitation, as I have formerly and clearly ſhewn. Wherefore I hold that a *Diabetes* is rather and more immediately a Diſtemper of the Bloud than of the Reins, and that it takes its original from thence, in as much as the maſs of Bloud doth as it were melt and is too copiouſly diſſolved into ſerouſneſs; which indeed is very manifeſt from that vaſt quantity and great augmentation of Urin, which cannot proceed but from the melting, as it were, and conſumption of the Bloud. And that is the reaſon alſo why the remaining part of the Bloud, when the *Serum* of it flows away ſo plentifully, grows much thicker and more apt to curdle, as you may conclude from the quickneſs and ſtrength of the Pulſe: for at that time the heart moves more readily, to keep the Bloud by an unuſual exagitation of it, from curdling. Moreover to continue the fluidity thereof, which is apt to be in great danger through the great expence of ſerous liquor, they uſe to drink great quantity of potulent matter by reaſon of their exceſſive thirſt, and likewiſe the humours that are got into the ſolid parts, are ſucked back by the *It doth not proceed from an attraction in the Reins.* *But rather from a fuſion in the Bloud.*

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the Bloud, yea the very *parenchyma* or ſtuffing of them, is melted to ſupply it; in ſo much that thoſe who are troubled with this Diſtemper, are very thirſty and conſume away for droughth in a ſhort time.

The immediate cauſe of it is chiefly in the Bloud.

That therefore I may venture to tell you the immediate cauſe and true nature of the *Diabetes*, I am inclined to believe that the temper or mixture of the Bloud is ſo looſened, and in a manner diſſolved, that the watery particles cannot be kept in by the thicker ones, but flying quickly out of their embraces, and being impregnated with ſalt ones, run out through the moſt open paſſages of the Reins. But in the mean time to dilute the Bloud, and keep it from curdling, other humours both from without and within too, are drawn to, and mingled with it, and the heart is put always into a far more violent motion.

Sometimes partly in the Reins.

Yet farther, I think that the Reins alſo, ſometimes are ſome part of the immediate cauſe, becauſe their ferment uſes oftentimes to be ſo vitiated, that it cannot keep the Bloud by the influx of its lixivial Salt in a due mixture and fluidity, in ſo much that the *Serum* is ſeparated from it by mere percolation; but it ſometimes happens, that the Bloud, whileſt it paſſeth through the Reins, is precipitated by an acid Salt that lodges there, (as it were by a kind of Rennet) into a plentiful quantity of *Serum*, which is immediately carried off by the Ureters. Hence you may obſerve that in many People, who are liable to the Stone in the Kidnies, that when the fit comes they make water clear and in great quantity. The reaſon of which is, becauſe the acid humour which is brought thither through the nervous paſſages, and cauſes the pain (as I have ſhewn elſewhere) diſſolves the Bloud that flows into the Reins, and cauſes a more copious flux of Urin for it.

But it is probable enough that copious piſſing proceeds in ſome meaſure from the ill conformation or make of the Reins; in as much as the lymphatick or water-pipes thereof are too wide and open, and do too eaſily receive the ſerous liquor, and ſwiftly tranſmit it without any let or ſtop, in ſo much that the greater part of it runneth out into urin. But though I grant that theſe Pipes or Paſſages are ſometimes, and eſpecially in thoſe that are troubled with the Stone, too wide, yet by that reaſon the Piſs ſhould come away rather bloudy than in too great quantity. And indeed I think that piſſing of Bloud proceedeth principally from ſuch a cauſe. Moreover when copious piſſing and piſſing of Bloud come together, I am of opinion that an ill temper of Bloud, and an ill make of the Reins do concur as cauſes of that effect; as I ſhall by and by ſhew you in a notable caſe of a perſon troubled with that Diſtemper.

This Diſtemper proceeds moſt commonly from the diſſolution of the Bloud.

In the mean time I do not queſtion but that the principal and moſt frequent cauſe of the *Diabetes* conſiſts in the Blouds mixture being too much looſened and diſſolved; as on the contrary, in like manner our piſſing little, and leſs than we ſhould do, depends oftentimes upon the conſtitution of the Bloud being too much bound, and as it were, locked up in the veſſels. And here it will be convenient to inquire whether the total ſuppreſſion of the urin doth not ſometimes proceed from ſuch a cauſe? For though it be vulgarly known, that the cauſe of a ſtrong and obſtinate Iſchury [or retention of the urin] which is very often ſeated below the Kidnies, doth altogether depend upon the total obſtruction of the urinary paſſages; and though when I my ſelf have opened many that have died of a total ſuppreſſion of the urin, I have found in them all, that the invincible cauſe of their death was the ſtopping of one Ureter, which a little before was wide open (the other being a long time before quite cloſed) by a ſtone newly got into it: Yet the learned Dr. *Riverius* tells us of two caſes, wherein two People that were troubled with a total Iſchury [or ſuppreſſion of urin] for ſeveral days, and were cured meerly by letting of Bloud; and therefore he aſcribes the cauſe of the Diſtemper to the emulgent veins being exceſſively diſtended, in ſo much that they could not contract themſelves to throw out the *Serum*, as we often ſee it is in the bladder of urin, which being very full, is not eaſily diſpoſed for diſcharging the Piſs. But indeed, though I believe his Stories, as I ought to do, yet I cannot think I ought to aſcent to his reaſon. For that which this excellent perſon aſſigns to them is not the office of the emulgent veſſels; for they are not Veins but Arteries, that conſtantly carry the *Serum* with the Bloud, without any danger of fulneſs or obſtinacy of the urin; and when the *Serum* doth not eaſily run out into the open paſſages, the reaſon ſeems to be, becauſe the maſs of Bloud being too cloſe and compact, doth not diſmiſs the watery liquor which is mixed ſo intimately with it, out of its embraces, without ſome difficulty.

Suppreſſion of the urin proceeds from the compactneſs of bloud.

It is confirmed by Anatomical Obſervations.

To this purpoſe I will tell you of an Anatomical obſervation lately made upon the body of the Reverend Biſhop of *Cheſter*. When that excellent perſon, who was long troubled with the Stone, at laſt died of a long ſuppreſſion of his urin, immediately

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all People presumed that the cause of his death was a stoppage in his Ureters caused by a Stone or other gravelly matter; but having made a very strict inquiry into it by Anatomy, they could find no obstruction at all in those passages, nor any stoppage of the urin. Such another observation as this, which was not long ago made by himself, Dr. *Lower* told me of; that is to say, where a mortal Ischury had left no tracts at all of it self about the urinary passages: from whence a man may easily conjecture, that seeing the Reins also were sound and well, the cause of the Distemper consisted totally in the excessive concretion and compactness of the bloud.

The original cause of a Diabetes.

But to return thither from whence we digressed; Now that we have shewn you the immediate cause and true reason of a *Diabetes*, let us proceed to find out the procatarctical or more remote and original causes thereof. If therefore you enquire why the constitution of the Bloud grows so lax and dissolute, and apt to melt, as it were, into *Serum*, I say, that the fusion of this, just as of Milk, proceeds from the meeting and associating of several kinds of Salt in the mass of it, whereby the other particles, being freed from the saline ones (that separate them from each other, and keep them in a due mixture) divide themselves presently into several parties. Now if you inquire farther how those Salts (by whose private combination we suppose the Blouds mixture to be dissolved, and the fusion of it introduced) come thither; I need not trouble my self long to shew you: for it is very manifest that there are always naturally in the mass of Bloud both saline-fixed and volatile particles, to which if there be added an acid or fluid Salt in a good quantity, it will easily cause the aforesaid effect. Hence it is that Rhenish Wine, Cider, and all acid Liquors, if you drink them, cause a more plentiful evacuation by urin than ordinary; and therefore likewise it is, that in some valetudinary or sickly People, whose Bloud abounds with an acid Salt, all Medicins impregnated with fixed or volatile Salt are used to provoke urine. Nor doth this Distemper proceed onely from things that we take in, but very often also from humours generated within. You may observe, that a great many, who are subject to Convulsions, before and after their Fits, make a vast quantity of clear water; of which no doubt the cause is, for that the dregs, or refuse of the bloud and nervous juice which are gathered together in the solid parts, if at any time, after they are turned sowrish, they swell and flow back into the bloud, they cause a fusion or dissolution in it, and consequently a great flux of Urin. Wherefore seeing such a flux of the Urin is constant and habitual, nothing can be said more probably, than that the excrementitious humours which are carried out into the solid parts, and after they have contracted a sowerness there, return thence into the Bloud, dissolve the liquor of it into too great a quantity of *Serum*, and consequently cause such a continual and excessive evacuation.

As chiefly acid humours, that get into the Bloud, and fund or precipitate it like Milk.

Such acid humours proceed chiefly from the Nerves and the nervous parts.

But for a principal share in this malady, we may justly bring in the nervous juice; for I have elsewhere shewn that this same juice, if ever it degenerates from its right temper, becomes very malignant and hurtful not onely to other humours, but to the solid parts: and that is the reason that from the depravation of this, the mixture also of the Bloud is very much in danger to be perverted. But that the nervous juice it self is perverted, we may conclude, because in a *Diabetes* the animal spirits are exceeding fainty, and all nourishment is immediately frustrated.

Moreover, for an extraordinary confirmation of this opinion, I have observed in many People who have been subject to this disease by intervals, that a little before they fell into such a flux of urin, they felt flying, running pains through their whole Bodies, and corrugations, sometimes with dizziness or stinging, and other whiles with frequent contractions or convulsions, twingings of the tendons, and other disturbances and restlessness of the spirits; which was a certain sign that the liquor which moistened the nervous fibres, being degenerated from its temper, and filled with dregs, did irritate or provoke the spirits, and force them into disorders. And then afterward, when the recrements and superfluities of the nervous juice, having gained a fluidity, ran out into the mass of bloud and caused a *Diabetes*, the aforesaid symptoms ceased, but then there ensued a languishment in the spirits, and a weakness all over the body.

How a Diabetes and a Dropsie differ.

A *Diabetes* is commonly called *Hydrops ad matulam, i. e.* a Dropsie in the Chamber-pot, and some will needs have both those Distempers to be really the same, and to have the same causes and reason of their being, and that the symptoms in them are varied only according to the measure of evacuating the *Serum*; to wit, that the bloud in both Distempers alike being not able to contain its *Serum*, but forced to discharge it by the Arteries, in the one, poureth it forth into the habit of the body and cavities of the bowels; and in the other throws it out into the Reins, to be carried away in great quantity by the Ureters. But indeed, if the thing be more accurately weighed, you shall find a very notable difference between these two Distempers: For an *Anasarca*

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[or Dropſie that runs through the habit of the Body] oftentimes takes its original firſt from the Blouds being weak and too cold, which is the reaſon that it is not ſufficiently kindled and heated, ſo as to perfect aſſimilate and volatiliſe the chyle which continually comes into it, in ſuch a meaſure as that it may keep it within its embraces whileſt it circulates; but muſt of neceſſity ſpew it out in all places, together with the ſerous liquor, and leave it in the interſticies or diſtances between the Veſſels; and then after, when the Diſtemper grows ſtronger, the bloud becomes not onely weak by reaſon of crudities, but being degenerated in its temper, is liable to fluxions and coagulations, and conſequently begets ſerous humours, and that in a greater quantity, pouring them with extraordinary violence into parts that ought not to receive them. But on the contrary in a *Diabetes* the bloud is kindled, and heated enough at leaſt, yea many times too much; and concocts the chyle that comes into it very quickly, and beyond all meaſure: beſides that it melts, as it were, the ſolid parts, and ſucks in their meltings, carries them with it round through the veſſels, and digeſts them more than it ſhould do: but yet, when through the concurrence of the Salts, the compoſition of the Bloud is quite diſſolved and melted into *Serum*, ſuch portions of it as can get away, being ſeparated within the Reins, run out at the Ureters. If a Diſeaſe like to the *Diabetes*, though inverted (that is to ſay, in which the bloud being diſſolved into a ſerous matter poureth forth all its meltings into the whole Body) doth any where at all preſent it ſelf; without doubt it was formerly the epidemical Fever, commonly called the *Engliſh Sweat*; when the Bloud melting into a wateriſhneſs, threw out all Humours as well good as bad, even to the expence of the vital nutriment it ſelf, into the pores of the Body, to be by them diſcharged.

The evident cauſes of a Diabetes.

Thus much for the nature and cauſes of the Diſeaſe called *Diabetes*, that is to ſay, the immediate and original or more remote cauſes: as to the evident ones, to wit, the occaſions whence the acid juices that cauſe the fuſion or coagulation of the Bloud, are generated in our Bodies: theſe are of a different kind, and from a different origination. An ill ſort of Diet, and eſpecially a daily and immoderate drinking of Cider, Ale, or Wines that are acid; ſometimes alſo ſadneſs, or long ſorrow, as likewiſe convulſions, and other depreſſions and diſorders of the animal ſpirits are uſed to generate or foment this morbid diſpoſition. I knew a certain perſon who having uſed Rheniſh Wine for his ordinary drink twenty days together, contracted an incurable *Diabetes*; of which, notwithſtanding the advice of many excellent Doctors, and whatever Remedies they could uſe, he died in a Moneths time. I remember two Women, who being ſubject to convulſive and hypocondriacal Diſtempers, happened ever now and then to have a great flux of Urin, with languiſhing and conſumption of their fleſh.

The explication of Symptoms in a Diabetes.

Having already explained the Theory or ſpeculative part of this Diſeaſe, it ſtill remains that I give you the reaſons of the moſt notable ſymptoms in it. Now ſome of theſe I am of opinion are very plain from what I have ſaid; that is to ſay, why in a *Diabetes* the evacuation of the Urin is ſo ſwift and copious: but whereas the Parties troubled with this Diſtemper are feveriſh and very thirſty; the reaſon is partly becauſe the humours and juices wherewith not onely the bloud, but the ſolid parts are both moiſtned and refreſhed, are through a continual drain by Urin exceedingly exhauſted; whereupon the jaws are dry, and the heart burns extremely; and partly by the inſtinct of Nature the heart and lungs are forced into more rapid motions, that the bloud, being deprived of the *Serum* to dilute it, may be kept from coagulation or concretion, and continued in its due circulation.

Whence frequent and copious piſſing.

Whence a Fever with thirſt and conſuming drought.

Why the Piſs of thoſe that are ſick of this Diſeaſe is ſweet like Honey.

But it ſeems more hard to demonſtrate, why the Piſs of ſuch as are ſick of this Diſtemper, is ſo wonderful ſweet, or ſhould taſte like Honey; when rather on the other hand, if according to my hypotheſis, the diſſolution of the bloud, and (which is the conſequence of it) the flowing of the urin happens through the combinations of Salts, the liquor ſurely that were impregnated therewith ſhould be ſaltiſh more than ſweet. But to this I eaſily reply, and ſay, firſt that the Urin is deprived of any ſalt taſte, in as much as ſeveral Salts that are of a different nature are united in it. For this is evident from the manifold experiments among Chymiſts, that when Salts, that are of a different kind (as fixed or volatile) are mingled with an acid, the ſharpneſs of them both is rebated or loſt: wherefore we have no reaſon to wonder that the Urin of thoſe who are ſick of a Diabetes is not at all ſalt. But why it ſhould be ſo wonderfully ſweet, like Sugar or Honey, is a knot not eaſie to untie.

A body would think that this effect aroſe from hence; to wit, that not onely the freſh nutritive liquor, but alſo the diſſolutions of the ſolid parts were carried off along with the *Serum* that ran out through the Reins; wherefore it ſeems very probable that this ſweetneſs proceeds from thoſe rich juices being mixt with the Urin. But indeed from that mixture there cannot proceed an Honey taſte, but onely a gentle ſoft one

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like that of Milk or Fleſh Pottage: and likewiſe to this, which is not onely grateful, but in ſome meaſure poignant too, the ſaline ſharp particles, and the delicate ſmooth ſulphureous ones too (as I have elſewhere ſhewn) ought to concur. Wherefore as we juſtly refer or aſcribe Sugar and Honey to a concretion of Salt and Sulphur, ſo we may imagine, that the Urin in a Diabetes is ſo ſweet, becauſe ſome ſulphureous particles taken from the conſumption of the ſolid parts, grow to the Salts that are united in the *Serum*. *Phar. Rat.* Part. I.

It proceedeth from a mixture of Salt and Sulphur.

As to its prognoſticks or fore-knowledge, this diſeaſe at firſt beginning is oftentimes eaſily cured; but when grown ſtrong upon a man, very ſeldom and with great difficulty; in as much as the temper of the Bloud, being a little looſened, is reduced without much ado, but when it is much diſſolved, ſo that moſt of its parts ſeparate from each other, it is hardly or never to be reſtored. *The fore-knowledge of this Diſeaſe.*

But as to the Cure of it, it ſeems very difficult in this Diſtemper to point out the true way of curing it; for as much as the cauſe of it lies hid in ſuch obſcurity, and hath an original ſo very deep and remote. For as to the common opinion, that the Reins and other ſolid parts, which contain or tranſmit the *Serum* are in fault, in that they too ſuddenly let go that which is in them, and conſequently, that we ſhould chiefly and almoſt onely inſiſt upon things that are aſtringent; I ſay, that not onely Reaſon but Experience too, do both contradict this ſuppoſition and practice; becauſe few or none at all are cured by this Method; and it is highly improbable (not to ſay, impoſſible) that ſuch an exceſs of piſſing ſhould proceed from ſuch a cauſe.

Therefore in this Diſtemper, as in ſeveral others, there are three primary Indications or ways pointed out how to cure it; to wit, the Curatory, Preſervatory, and Vital. The firſt of theſe reſpecting the Diſeaſe, and endeavouring to reſtrain exceſſive Piſſing, cannot be performed without the ſecond, which aiming at the cauſe of the Diſtemper, ſtrives to preſerve or reſtore the due mixture or temper of the Bloud. Wherefore in the cure of this Diſtemper, the chief ways of perfecting it will be, to prevent the diſſolution of the Bloud, and to remove it, if in any meaſure already cauſed. Firſt the fuſion of the bloud is hindered, if ſo be that the thicker and more wateriſh parts thereof contain or keep in, and are mutually contained by each other, ſo that one part do not ſo continually and ſpeedily ſeparate from the reſt; which is brought to paſs by remedies that are commonly called *Thickning Medicins*; that is, ſuch whoſe very viſcous or clammy and glutinous particles, being admitted into the maſs of bloud, do obſtinately ſtick to the active corpuſcles thereof, and ſo ſeparating them from one another, are an hindrance to their floating, and mutually uniting among themſelves, or with the ſaline ones that are poured in from other parts. To this end Rice, White Starch, ſlimy Vegetables, and alſo Gums, aud ſome reſinous bodies are uſed to prove good in this Diſtemper. Secondly, To take off the diſſolution of the Bloud when it is in any meaſure cauſed, you ought to uſe ſuch Remedies as diſſolve concretions of the Salts, ſo that all the elementary particles that are in it, being again reſtored to their native circumſtances, may recover their former ſituations, and by that means renew the original temper of the Bloud. I formerly told you that this kind of effect is produced in Milk that is curdled by the addition of fixed, volatile, or nitrous Salt, and likewiſe by the infuſion of Spirit of Hartſhorn, Sal Armoniack, and the like. Of which (as I have there alſo intimated) this without doubt is the reaſon, that whileſt the ſaline-fixed, volatile, or nitrous particles, being put into the Milk in a good plentiful quantity, meet with the acid or precipitatory particles, and are united to them; the other ſaline ones, which before were bound, being now freed and ſcattered through the maſs of the liquor, may every way diſunite and ſeparate the ſulphureous and earthy ones that are united among themſelves, and conſequently, that all the particles being again equally mixed, may contein or keep in, and be contained by each other. How much the Bloud, that reſembles Milk, is altered by pouring ſalt diſtilled liquor into it when it is hot, I have there alſo declared by Experiments that I have cited. But for the Cure of a Diabetes, we do not eaſily, or inconſiderately give ſalt Medicins, becauſe by moſt men they are looked upon to be always Diuretical; though in the mean time neither reaſon nor experience contradict this method. For I many times in this Diſtemper have preſcribed the tincture of Antimony with good ſucceſs, and the Water of ſlacked Lime, with Shavings of Saxaphras, Aniſeeds, Raiſins, and Licoris, according to the common Receipt, is by ſome very highly commended.

Three Indications pointing to its Cure.

The chief intentions of the Cure:

1. To hinder the fuſion of the Bloud.

2. To remove it when cauſed.

3. The Vital Indication is performed by thickning and moderately cooling Diet, and by Cordials that are temperate, and eſpecially by convenient and ſeaſonable hypnoticks or ſleeping Medicins, of which ſome of the chief ſorts and choiceſt Receipts are laid down in the following Chapter, and in the end of this, for a farewel, I thought

3. The Vital Indication.

Phar. Rat. Part I. I thought fit to tell you the Story of a certain Nobleman that was ſick of this Diſtemper whileſt I firſt meditated upon, and afterward wrote this Diſcourſe.

A Story. A certain noble Earl, renowned not onely for the ſplendour of his Birth, but for the extraordinary qualifications and endowments of his mind, being of a ſanguine temper, a florid complexion, and in the very vigour of his Age, (no body knows upon what occaſion) became much inclined to exceſſive Piſſing; and when for ſeveral Moneths he had been uſed ever now and then to make great quantities of Water, he at laſt (it ſeemed) fell into a Diabetes that was obſtinate, ſtrong, and almoſt deſperate. For beſides that in the ſpace of 24 hours he voided almoſt a Gallon and an half of limpid, clear and wonderful ſweet water, that taſted as if it had been mixed with Honey; he was likewiſe troubled with an extraordinary thirſt, and as it were, an Hectick Fever, with a mighty languiſhing of his Spirits, weakneſs in his limbs, and conſumption of his whole body.

When at this time I was ſent for to conſult with theſe excellent Phyſicians Dr. *Michlethwait*, and Dr. *Witherly*, they had preſcribed the following Remedies, by the uſe of which, he in a ſhort time, ſeemed to grow well again.

An inſtance of a Cure. *Take of the Tops of Cypreſs* viij. *handfuls, of whites of Eggs beaten together, two pints, of Cinamon* ℥ ß. *when you have cut them ſmall, pour to them of new Milk* viij. *pints diſtil them in the common Inſtruments, taking care that it burn not: and let the Patient take* ℥ vj. *thrice a day.*

Take of Gum Arabick, and Gum dragant, each ℥ vj. *of Peneds* ℥ j. *make a Powder, and let him take about* ℥ j. *or* ℥ j. ß. *twice a day with* ℥ iij. *or* ℥ iv. *of diſtilled water.*

Take of Rhubarb pulverized, gr. xv. *of Cinamon* gr. vj. *make a Powder and let him take it in the morning, repeating it within* 6 *or* 7 *days.*

Take of Cowſlip water ℥ iij. *of Cinamon-barley water* ℥ ij. *of Syrup of Poppies* ℥ ß. *make a Potion, to be taken every night.*

His Diet was onely of Milk which he took ſometimes raw, and diluted either with diſtilled or Barley water, and ſometimes boiled with white Bread, or Barley, ſeveral times in a day. By the uſe of theſe things growing daily better and better, he ſeemed within a Moneth to be almoſt quite well: when he began to be pretty hearty, his Urin which was inſipid, did not much exceed the quantity of that liquid matter which he took in; and afterward growing ſomewhat ſaltiſh, it was leſs than what he drank, till at laſt by degrees recovering his uſual tenor of ſpirits and ſtrength, he returned to his former Diet.

The Relapſe of this Diſtemper. But yet the diſpoſition to this Diſtemper did not ſo totally leave him, but that afterward, oftentimes, through diſorders in his Diet, and perhaps irregularities in the ſeaſons of the Year, being inclined to a relapſe, he made water at firſt in great quantity, and then clear and ſweet, with thirſtineſs, feveriſhneſs, and languiſhment of his ſpirits. But by the uſe of the ſame Medicins he was uſually cured again in a ſhort time. Not long ago, after a long interval of health, a little before he began to ſuffer his flux of Urin, he underwent great enormities and conſumptions in the nervous parts; that is to ſay, he felt drowzineſs and whimſey in his Brain, ſudden convulſions in his limbs, twinges of the tendons, and various runnings, as it were of a wind, to and fro. After which when the aforeſaid ſymptoms ſeemed to be removed by the uſe of proper Medicins, the Diabetes after its uſual manner (that is, when the matter flowed out of the fibres and ſolid parts into the Bloud, and from thence into the Reins and urinary paſſages) returned afreſh upon him.

About this time the aforeſaid Phyſicians being called to a conſultation preſcribed almoſt the ſame method and remedies as before, by the uſe of which, being in a few days ſomewhat better than before, they thought good to preſcribe to him water of ſlacked lime, to be taken thrice a day, by ℥ v. or vj. at a time; which remedy when he had uſed four days together, he made water very moderately, that was of a good colour, and ſomething ſaltiſh, and ſeemed in almoſt all other circumſtances, to be as well as ever he had been.

CHAP.

Phar. Rat. Part I.

CHAP. IV.

The ſeveral Sorts and Receipts of Medicins that ſtop exceſſive Piſſing.

THoſe Medicins that are properly called Aſtringents, that is to ſay, ſuch things as are auſtere, ſower, and ſtyptick or binding, which by wrinkling up the fibres of the bowels, and drawing them into a leſſer ſpace, rebate their expulſive and evacuating faculty, and conſequently hinder purging both upward and downward, though they are commonly preſcribed, yet they do little or nothing toward the reſtraining of Urin: for their virtue is of no force in the maſs of bloud, nor doth it at all reach the Reins or the Bladder. Wherefore in a *Diabetes* it is to no purpoſe that they preſcribe the Bark of Pomegranates, Balauſtians, Medlars, Roots of Tormentil, and the like; as Reaſon dictates this, ſo Experience confirms it. But the Remedies which are found to be of greateſt uſe in a *Diabetes*, and moſt exactly to ſquare with my Hypotheſis, are, as I formerly intimated, of a twofold kind; that is to ſay, firſt, ſuch as hinder the combinations of the Salts, and conſequently the fuſion of the bloud; of which ſort are thoſe that are commonly called *Thickeners*, and have viſcous and glutinous particles, which being admitted into the maſs of Bloud, ſtick faſt to the active particles thereof, and disjoin them, and keep them from uniting either among themſelves, or with the ſaline ones that flow from other parts. Secondly, Such as diſſolve the accretions or unions of the Salts, and conſequently reſtore the mixture of the Bloud; of which kind are thoſe ſaline parts, of another nature, which are apt to ſtick cloſe to the acid Salt, and by that means to ſeparate it from thoſe combinations that are made within the bloud; as are chiefly Medicins impregnated with fixed, and alſo with volatile and alchalized Salt. Beſides theſe two chief kinds of Iſchuretick Medicins, there remains another with a ſecondary ſort, to wit, Hypnoticks, or ſleepy Medicins; that is to ſay, ſuch as by putting a ſtop to the animal motion cauſe the affairs of living to be carried on much more ſedately, and conſequently with leſs fuſion of the bloud, or precipitation of the ſerous and nutritive humour. It now remains that I ſubjoin ſome ſelect Receipts of every ſort of theſe Medicins.

Aſtringents do no good in a Diabetes.

Three ways to cure it.

1. The firſt thing that the Phyſician aims at, that is to ſay, by thickening the bloud to take off, or to prevent the fuſion thereof, is attained in manner following. *For thickning the Bloud.*

Take of Gum Arabick, and Gum Dragant pulverized, each ℥ j. of Peneds ℥ ß. make a Powder, and divide it into 16 parts. Take one part thrice a day, diſſolving it in diſtilled water, or in the decoction of Comfrey roots, in Spring water, or in Milk. *A Powder.*

Take of reſumptive Electuary ℥ iij. of the Species of Gum Dragant cold, ℥ j. of red Coral prepared ℥ ij. Confection of Jacinth ℥ j. ß. of the Gelly of Vipers skins a convenient quantity; make an Electuary to be taken thrice in a day, the quantity of a Wallnut. *An Electuary.*

Take of the whiteſt Amber, Maſtich, and Olibanum pulverized, each ℥ j. of Pulvis Haly ℥ ij. of Balſam of Tolu ℥ ß. make a ſmall Powder; whereof the Doſe is ℥ ß. thrice or four times in a day. *A Powder.*

Take of the roots of greater Comfrey, and of Water Lillies, each ℥ iij. of Dates cut in pieces ℥ ij. of the Seeds of Mallows, Cotton, Plantaign, and Flea-wort, each ℥ ß. boyl them in Spring Water iv. *pints to an half; to the ſtraining of it put of the Syrup of Water Lillies ℥ ij. The Doſe is ℥* iv. *thrice a day.* *A Decoction.*

Take of the Decoction of Barley, with roots of Water Lillies one pint and half, of Sweet Almonds prepared ℥ j. ß. of Seeds of white Poppies, Purſley, and Lettice, each ℥ ß. make an Emulſion according to Art. The Doſe is ℥ iv. *thrice a day.* *An Emulſion.*

Take of the tops of Cypreſs m. vj. *of the leaves of Eſalarea* m. iv. *of the Flowers of Archangel or white Nettle, of Comfrey, and of Water Lillies, each* m iv. *of the roots of Water Lillies and Comfrey, each* lb ß. *of Mace ℥ j. when you have ſhreded them altogether very ſmall, pour to them of new Milk* viij. *pints; diſtil them in the common Veſſels. The Doſe is ℥* iv. *thrice a day, with the Powder or Electuary before preſcribed.* *A diſtilled water.*

Secondly,

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The reduction or fixing of the bloud.

Secondly, Although ſalt Medicins of every ſort and ſtate are looked upon to be diuretical, and every one of them in ſome caſes, as far as they diſſolve the bloud, and cauſe the ſerous parts of it more copiouſly to ſeparate, are in ſome meaſure really diuretical, for this reaſon, though the uſe of them in a *Diabetes* may be juſtly ſuſpected, yet upon the account of what I have before ſaid, to wit, that by meeting with the acid Salt (when it predominates in the bloud) they take off and prevent the fuſion and melting thereof, I do not at all queſtion, but that ſometimes they may be given with ſucceſs for the ſtopping of immoderate evacuations by Urin; and as ſoon as ever I have an opportunity, I am reſolved to trie the truth of this by a cautious experiment: and indeed that ſuch an experiment may be with ſafety made, is manifeſt enough from this, that I have heard for a certain of one who was cured of a *Diabetes* by an infuſion of ſlacked Lime. But becauſe thoſe ſaline Medicins (which we ſuppoſe do either take off, and as it were fetter the acid Salt) are impregnated with fixed, or volatile, or alchalized Salt, I will cite ſome Receipts of Iſchuretick Medicins, in which each of theſe are the foundation.

Medicins impregnated with fixed Salt.

First therefore when fixed Salt by it ſelf, or joined with Sulphur, is required for the foundation.

Tinctures.

Take of the Tincture of Salt of Tartar, or the Diliquium of it, a convenient quantity; give it in a ſmall draught of the Decoction, or diſtilled Water juſt now preſcribed thrice a day.

Take of the Tincture of Antimony, and give it the ſame way thrice a day. I know by frequent experiments that the uſe of this is very advantageous in this Diſtemper.

Take of the Salt of Coral ℈j. *to be given in the ſame manner.*

An Infuſion.

Take of the infuſion of ſlacked Lime one pint. The Doſe is ʒ iij. or ʒ iv. *thrice a day, giving firſt of all a Doſe of the Electuary or Powder before preſcribed.*

An Electuary.

Take of Conſerve of the Flowers of Archangel, and the greater Comfrey ʒ iv. *of the reddeſt Crocus of Iron* ʒ ß. *of Coral calcined to a whiteneſs* ʒ ij. *of Syrup of Comfrey a convenient quantity: make an Electuary. The Doſe is* ʒ ij. *thrice a day.*

A Powder.

Take of Lapis Specularis calcined ʒ j. *The Doſe is from* ʒ ß. *to* ʒ j. *twice or thrice a day.*

Country men with this Medicin do very ſucceſsfully cure their Cattle that are troubled with piſſing of bloud.

Take of Coral calcined to a whiteneſs and pulverized ʒ iij. *of Powder of Gum Arabick and Gum Dragant, each* ʒ j. *make a Powder, and divide it into* 10. *parts, whereof take one, thrice a day in a convenient vehicle, to wit, the Decoction, or the Diſtilled Water.*

Take of the reddeſt Crocus of Iron ʒ vj. *of Gum lac. pulverized* ʒ ß. *of red Saunders* ʒ j. *make a Powder, and divide it into* 20. *parts, of which take one thrice a day.*

A Decoction.

Take of Harts horn burnt and pulverized ʒ ß. *boil it in* iv. *pints of water wherein Iron is quenched till it waſte to half, then add at the laſt a cruſt of bread, and of the roots of the greater Comfrey, and of dried Water Lillies, each* ʒ j. ß. *to the ſtraining whereof put of Sugar of Pearl* ʒ ij. *Let the Patient take* ʒ iv. *thrice a day.*

Medicins impregnated with alchalized Salt.

2. Medicins impregnated with alchalized Salt, ſuch as Corals, Pearls, Cuttle bone, Harts horn, Ivory, Powders of Shells, and the like, are very commonly uſed, not onely againſt Rheumatical Diſtempers, but alſo in a *Diabetes*, and indeed according to my Hypotheſis, in as much as they receive the acid Salt which abounds in the bloud, and conſequently free the maſs of bloud from diſſolution; you may from them expect benefit, and that moſt commonly with ſucceſs.

A Powder.

Take of red Coral ground very ſmall, and of Cuttle bone, each ʒ ß. *of Harts horn philoſophically calcined* ʒ iij. *of Pearl, Ivory, and Crabs Eyes, each* ʒ j. *mingle them and make a Powder. The Doſe is* ʒ ß. *thrice a day in a convenient vehicle.*

Take

Take of the ſame Powder ʒ iij. *of the Species of Gum Dragant cold* ʒ ij. *of Sugar Candy* ʒ ij. *make a Powder, with a convenient quantity of the diſſolution of Gum Arabick, and make a Paſte. Form it into Trochies of the weight of* ʒ ß. *of which take* iij. *or* iv. *thrice or oftener in a day.* *Phar. Rat.* Part I.

Take of the ſame Powder ʒ iij. *of reſumptive Electuary* ʒ iv. *of the Conſerve of the Flowers of Water Lillies* ʒ iij. *of the Syrup of the ſame a convenient quantity, and make an Electuary. Let the Party take the quantity of a Cheſnut thrice a day, drinking thereupon a draught of the Apozeme or deſtilled Water before preſcribed.* *An Electuary.*

3. For the ſame reaſon that Medicins impregnated with fixed and alchalized Salt ſeemed good to cure a *Diabetes*, thoſe alſo that have volatile Salt in them may conduce to the ſame effect. For the latter as well as the former receive and ſeparate the acid Salt (whereby the bloud is diſſolved and melted into a ſeroufneſs) and conſequently the liquor thereof recovereth its due temperament. *Medicins impregnated with volatile Salt.*

Take of Tinctura Solaris with Sal Armoniack (prepared as I uſe eaſily to do it) ʒ j. *The Doſe is* 20. *drops thrice a day: Spirit of Bloud, Soot, Harts horn may alſo be tried in this Diſtemper.* *A Tinſture.*

Take of the Salt of Amber ʒ j. *of the reddeſt Crocus of Iron* ʒ ij. *mingle them, and divide it into* 12. *parts. The Doſe is one part thrice a day.* *A Powder.*

As to the third ſort of Remedies againſt a *Diabetes*, that is, Hyphoticks; which by ſtopping the animal Spirits, retard the courſe of the bloud, and conſequently ſomewhat hinder the boyling and diſſolution thereof; I uſe in ſome caſes to preſcribe Diacodium, to be taken every Evening; and if at any time that doth not do the buſineſs, to give Liquid Laudanum, prepared with Quinces or tartarized, ſometimes every night, and ſometimes every other night with good ſucceſs. *Hypnoticks.*

Take of the Decoction of Barley, with ʒ ß. *of the roots of dried Comfrey* ʒ vj. *of white Poppy Seeds* ʒ ij. *of ſweet Almonds prepared in number* vj. *and make an Emulſion according to Art, to be taken each night when you go to bed.*

Take of the Migiſtral Water before preſcribed ʒ iij. *of the diſſolution of Gum dragant* ʒ ij. *of Diacodium* ʒ ß. *to* ʒ vj. *to be taken at night, when you go to ſleep.*

Take of the Conſerve of the Flowers of Water Lillies ʒ ij. *of Laudanum tartarized or prepared with Quinces* ℈ j. *of the Tincture of Saffron drops* vj. *make a Bolus, to be taken when you go to ſleep.*

SECT.

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SECT. V.

CHAP. I.

Of Sweating and Medicins that cause evacuation thereby.

One way to take in, but many to let things out of the body.

The reason of it is intimated.

FOr the nourishment of the Bodies of Animals, their food is taken in onely one way, that is through the mouth; but provident Nature hath made many outlets or ways for evacuations, through which the baser parts of the nourishment or any disagreeable particles, whether they come from without, or are generated within, are thrown forth. Indeed it was convenient that all the food should enter at the same door; to wit, that it might be sufficiently distinguished and examined; for if there were many, or Back-doors that opened inward, there might poisons easily creep in with the meat. Now, if against the intention of this single avenew, any hostile matter gets in, or through the failure of good management within, be ingendered there, this cannot lie hid in any retiring room or corner, but that there are in that same place some loop-holes open for the discharging of it. For if any heterogeneous matter lodgeth in the first passages, it is voided by Vomits or Purging; but if it go further and mingle with the bloud or nervous liquor, or stick to the solid parts, it is immediately thrown out by Transpiration, and Sweat, or by Urin. Again, If Nature, as being slothful, or hindered, doth not carry off extraneous things of its own accord, or quickly, or in sufficient quantity by these ways, then Physick supplies us with Remedies very necessary, to supply the defect or faults that are in the manner of evacuation or passages whereby it is, or ought to be performed. As therefore I have treated very largely in the former Chapters concerning Vomiting, Purging, and Pissing, and shewn by what dispositions of the Humours, Spirits, and Bowels, Medicins designed for those ends produce their operations; so now in the next place I must explain to you, how and by what Medicins extraordinary Sweating, if there be at any time occasion for it, is usually provoked. Now for the better explication hereof, I must first declare to you what is the matter and true nature of Sweat, and in what, and how many manners Sweating oftentimes happeneth without Physick, through external accidents, or the inward commotions of the Humours or Spirits.

Physick supplies the defect of natural evacuations.

How Sweating differs from Purging.

In Sweating, quite contrary to what it is in purging, the motion of evacuation tends from the first passages, and as it were the center of the body to the circumference; and in both these cases the Arteries carry more to the places of evacuation than the veins bring back, whilest in the mean time from places that are opposite to them, the veins bring back more than the Arteries carried thither. In a Purge, there is a greater burden imposed upon the splanchnical or bowel Arteries and Veins too, that relate to the habit of the body: but it is quite contrary in Sweating; for in this case whilest the Arteries carry the matter more than usually toward the outside of the body, the mesaraick veins carry away a greater quantity from the Bowels made for concoction, than the Arteries brought thither. So likewise in the other evacuation, whilest the splanchnical Arteries pour more than ordinary into the bowels, the outward veins bring back more from the habit of the body than the Arteries leave there. Wherefore as both these evacuations are caused several ways, so, not least of all in this manner; to wit, whilest the Arteries that belong either to the Bowels, or to the habit of the body, are put upon more rapid motions than ordinary, a greater load of Humours will be thrust into the Veins that are of the opposite side. How sweating Medicins perform both these intentions I shall tell you by and by. In the mean while concerning Sweating in general, I shall observe, that Sweating, in respect of perspiration, is just like a Lask in respect to the natural and ordinary way of evacuation; that is, it is onely a more swift and a stronger kind of perspiration. For whenever the bloud boyling up more than ordinary, and being as it were put into a flame, doth more copiously emit or send forth its hot particles, those particles conveying along with them certain parts of the *Serum* cause Sweat.

The matter of Sweat is either Elementary or Humoral.

1. What are the particles of the first.

The matter of Sweat may be called either Elementary or Humoral; and as to the former, that as well as Urin consists of a moderate spirit, salt and sulphur, a great quantity of serum, and a little earth. And that it is so, is easily gathered from the loss of spirits in sweating, the watery substance of this Excrement, the salt taste, unctuousness

neſs and feculency thereof. For whileſt the bloud (in order to prolong the life of Animals) is continually kindled in the Lungs, and then breaking forth, as it were, into a flame, is hurried out of the heart through the Arteries into all parts certain ſubtile particles, that is to ſay, ſpirituous and ſulphureous ones, as being moſt apt to fly away, do in great plenty depart out of the liquor thereof, when rarefied and kindled; which particles flowing through the pores of the body, carry along with them many ſmall portions of the *Serum*, and ſome alſo of the other Humours at the ſame time. Now if theſe kind of *effluvia* or emanations are few, they fly away inſenſibly, and exhaling moderately, vaniſh into the Air, ſo as that you can hardly perceive them; but if they are more numerous and break forth in great quantity, they are condenſed or thickned into water, whileſt they ſcarce paſs through the pores of the skin, juſt as when vapours ſent forth from boyling water, moiſten the pot-lid.

What the ſecond conſiſts of.

2. The Humoral matter of the Sweat is ordinarily ſcarce any other than the ſerum of the bloud, to which ſometimes, if the evacuation that way be inordinate, there are added ſome portions of the nutritive and nervous juice, with other humours gathered out of the bowels, glandules and lymphick or watery veſſels, yea, and likewiſe the ſubſtance or meltings of the ſolid parts: but yet whatever it is, it is voided chiefly out of the Arteries, though I do not deny that beſides that, there does ſome of it come out of the nerves too; ſo alſo that out of the fibres and ſolid parts ſomething of an humour is attenuated by the force of the heat into a vapour, which upon the skin thickneth again into a moiſture. But notwithſtanding it is the bloud onely that by its heat makes any humour evaporate, and from its own boſom ſends forth the greateſt part of that which ſweats out.

Three things required in ſweating.

To the end that Sweat may break forth in great quantity and eaſily, theſe three things are requiſite; that is to ſay, Firſt, That the bloud, when boyling up more than ordinary, ſhould circulate more rapidly than it uſually doth: Secondly, That the watery part of it ſhould abound with many aqueous particles, and thoſe looſened, that is, apt to be ſeparated from the reſt of the liquor, and changed into a vapour. Thirdly and laſtly, that the pores of the whole body be ſet wide enough open.

The firſt, that the bloud circulate more ſwiftly than it uſes.

1. The reaſon of the firſt condition ſeems manifeſt enough; for unleſs the bloud circulate rapidly, and be carried through the Arteries in ſo great a quantity, as that what remains above that which the Veins bring back again, cannot be wholly received in the lymphick veſſels, or exhaled by inſenſible perſpiration, there will be nothing ſuperfluous, to tranſpire by ſweating; for the liquor of Sweat conſiſts of the ſuperfluous and rejectaneous matter of thoſe paſſages. But the bloud circulateth more rapidly, in order to the producing of Sweat; in as much as through the more frequent and vehement compreſſions of the heart, it is driven about with a greater force. Of which effect, though there are ſeveral manifeſt cauſes, they may all, or at leaſt the chiefeſt of them, be reduced to the two kinds following.

Which depends partly upon the bloud, and partly upon the animal ſpirits.

For the actuating and variouſly altering the motion of the heart, the efficient cauſe are the animal Spirits that flow to it from the Brain; but the final cauſe is the circulation of the bloud: for as upon that account the motion of it was firſt ordained, ſo according as the bloud ought to circulate, upon ſeveral occaſions, ſometimes ſwifter and ſometimes ſlower, fiercely or quietly, or any other way, the beating of the heart alſo is variouſly altered. Whenever therefore that is augmented or quickened ſo, as that it cauſes ſweating, it comes to paſs either through neceſſity or indigence of the bloud, or the inſtigation of the animal ſpirits.

How upon the bloud.

1. Whenever the bloud is heated, or kindled more than ordinary, it ought to be carried about more rapidly than is uſual, leſt it ſhould be choaked within the folds of the heart. Now of ſuch a boyling or exceſſive kindling thereof, there are many cauſes and occaſions. For the bloud ſometimes ſwells of its own accord, like Wines, by its own ſulphur which is too much elevated. Moreover when it is exceedingly toſſed or heated, and more than ordinarily kindled by hot things taken in at the mouth, through the ambient heat, a ſwifter motion of the body, ſhutting of the pores, or other occaſions, it requires to be carried about ſo rapidly, to the end that it may cauſe ſweating.

And how upon the animal ſpirits.

2. Sometimes the bloud, though quiet of it ſelf, is put into an Hydrotick efferveſcence or ſweating heat, by the inſtigation of the animal ſpirits. For in acute Pains, violent Paſſions, great ſtoppages of the natural or vital Functions, in the very agony or pangs of death, and other faintings or diſorders of the ſpirits, where the health of the body is in great danger, the ſenſitive ſoul (to keep the vital flame of the bloud from going out) puts the heart into a very rapid motion, whereby whileſt the bloud is driven about with greater violence, it alſo cauſes for the moſt part ſweating.

The ſecond thing required in order to cauſe ſweating is, that whileſt the bloud boyls

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up very exceedingly, or is kindled more than usually, and sends forth great quantities of *effluvia* or streams from it, its liquor should abound with a serous humour, which may be also apt to separate and exhale from the other part of its mass; for otherwise there will break forth onely a dry vapour as from boyling Oil (though in the heat of a Fever, or any other great heat) and not at all any sweat. But they whose bloud being full of *Serum*, if of a loose and somewhat dissolved constitution, are put into a sweat upon every the least occasion. But if the *Serum* be defective, or is not easily separated from the bloud, as being too compact, or through the feculency that is in it, very thick; though a burning Fever come upon him, and at the same time the strongest sweating Medicins are administred, the Party shall hardly sweat at all.

2. The second condition of Sweating is, that bloud be loose and dissolved.

3. The third condition is, that the pores be wide enough.

Thirdly to procure sweating the right way, it is requisite that when the bloud boyls, and is diluted with an aqueous humour, which is easily separable from it, the pores of the skin also should be wide and open enough; for unless the body be perspirable, it is in vain to attempt sweating. Some mens skins are very thick, and almost impenetrable, to which if the Winters cold comes, you may sooner draw water out of a pumice stone than out of their hides.

The causes of excessive Sweating are intimated.

So much for the chief requisites toward the cause of sweating, which as they are sometimes partly deficient, in so much that the sweat comes very hardly or not at all away; so sometimes through the excess of these requisites, as likewise through some other inordinacies in the humours or habit of the body, too frequent and copious sweating doth usually infest some persons, so far that the nutritive juice is no sooner conveyed into the bloud, but immediately all of it sweating forth with the serous liquor out at the pores of the skin, is turned to a moisture. The reason of which, if we inquire into, there are these three things chiefly, in some or all of which they seem most chiefly to consist.

1. Of which the first is, an ill temper of the bloud, or a weakness in it, &c.

1. Therefore a too excessive inclination to sweating arises sometimes because the bloud being vitiated in its temper, and made too weak, cannot assimilate the nutritive juice, which it receives out of the chyle: wherefore, as a Stomach, whose tone is relaxed, it is forced to vomit out the humour which is poured into it, as soon as it is full of it. Hence it is that most commonly nocturnal sweatings, which are very troublesome, succeed Fevers in the day time; in as much as that in these the mass of bloud (like sower Milk which being heated over the fire is dissolved and precipitated into a wheyishness of its own accord without any thing to turn it put in) is of so loose a constitution, that it is loosened in its mixture upon any light occasion. To which you may add, that the bloud being impoverished is not fully kindled, whereupon the crude juices, by how much the less they are consumed by efflagration, must of necessity break forth by sweat so much the more copiously whilest the bloud is put into a brisk motion.

2. An obstruction of the passage of the Serum the usual ways.

Secondly, It is not improbable, that an excessive inclination to sweating may depend in some measure upon this cause also; to wit, that either the veins or lymphæducts do not in all places discharge their duty as they ought to do. For if perchance the serous superfluities of the Arterial bloud, are not immediately taken out one way or other, they must of necessity be somewhere gathered together to a great fulness, and consequently, if they are not evacuated by sweat, must needs hinder the circulation of the bloud, and oftentimes cause a Dropsie.

The third is openness of the Pores.

Thirdly, If at any time, for the reasons aforesaid, the inclination to sweating grows strong upon a man, the same also is augmented, and frequent and copious sweats flow forth, if the pores and passages of the skin are wider than they use to be: which disposition sometimes is natural, and sometimes contracted by accident. I have known some mens bodies so pervious and open that they could not indure so much as the lighteſt blast of Air; who likewise through any violent motion, or heat of the Sun, Fire, or their Beds, would presently dissolve into a sweat.

The true nature and immediate cause of Sweat.

From these things (which are necessarily required for the causing of sweat, and make it excessive) thus laid down, it will be easie to collect what is both the true nature of Sweat, and also the immediate cause of it: for both consist in this, that the bloud abounding with *Serum*, and being somewhat loosened in its constitution, whilest it is more rapidly carried about by the brisker pulsation or beating of the heart, and by that means more is carried forth through the Arteries, than that the bloudy part can be all strait brought back by the veins and the serous part discharged through the veins and lymphæducts, there is therefore a necessity that whatever *Serum* remains, impregnated also with other particles, should sweat out through the pores of the skin which are wide enough to admit it.

The remote causes of it.

As to other causes of sweating, to wit, the original, or remote, and the evident ones; those of the former sort respect either the mass of bloud, or the animal spirits. For

these

theſe being (as I formerly hinted) obnoxious to convulſive indiſpoſitions and other irregularities, do ſometimes of their own accord, or occaſionally put themſelves into exploſive and inordinate motions; whereby the heart alſo being exceedingly diſturbed, drives the bloud about with greater violence, and conſequently cauſes them to melt into ſweats. But the antecedent cauſe of ſpontaneous ſweating lies oftentimes in the maſs of bloud: for if at any time heterogeneous and foreign particles, or ſuch as are altogether diſagreeable, are gathered together to a fulneſs within the body of it, then finding it ſelf oppreſſed, it is preſently diſſolved, and boyls up, to ſeparate and throw out by way of ſweating whatever is troubleſom to it; together with the ſerous liquor. Which kind of Sweat, according as the peccant matter is eaſie, difficult, or impoſſible to be voided, is called either Critical (which is alſo more or leſs perfect) or ſymptomatical. Of theſe I have diſcourſed at large in my Treatiſe called *Puretologia* [or *A Diſcourſe of Fevers*,] ſo that I have no need to ſay any more in this place.

The evident cauſes of Sweat,

2. The evident cauſes of Sweat, that is, ſuch as without any original cauſe or phyſical Indication, cauſe ſweating very often, ſolitarily and by themſelves, being various and of divers kinds; to wit, ſuch things as are taken in at the mouth, things outwardly applied, too great a commotion in the mind or body, with many others; I have a mind in this place briefly to obſerve to you the chiefeſt of them, together with their diſtinct manners of working: which when you rightly underſtand, it will be the more eaſie to conceive how and with what difference the Medicins that are deſigned for this purpoſe cauſe that purgation by ſweat.

1. Commotions in the Body:

1. Firſt therefore Sweat is uſually produced by a more violent, laborious, and long motion of the body; as we ſee daily in Running, Dancing, carrying of Burdens, Drawing, and the like. The reaſon of which is, becauſe the muſcles of the whole body being violently exerciſed, compreſs the Veſſels that are between them, and conſequently put the bloud into a commotion, driving it rapidly to and fro; and ſeeing that by this means the veins are chiefly ſtraightned, the bloud glides the more eaſily through their cavities, which are ſtill wider and wider, and is much more ſwiftly carried toward the heart; and ſeeing the bloud in that manner being gathered to a great quantity within the right ſide of the heart, oppreſſeth, or almoſt choaks it, both the heart and lungs labour very vigorouſly with more frequent and ſtronger endeavours to drive the bloud about more rapidly, that ſo at laſt it being more inflamed within the heart, and conſequently rarefied and diſſolved, or looſened in its conſtitution, may exhale a great many more particles of heat, that is, of ſpirit and ſulphur; which conveying out along with them the ſerous parts, that (whileſt all the veſſels are ſo ſwollen) cannot be brought back again, make the Sweat. As in the body, ſo in the mind alſo, immoderate exerciſes cauſe ſweating.

Or in the Mind.

2. The ambient heat, or heat of the Air, &c.

2. The ambient heat [or heat that encompaſſeth them] as of the Sun, Fire, a Bath, an Hot-houſe, and the like, is apt to provoke ſweating; becauſe the hot particles that are conveyed into our bodies from without, and enter under the skin, do not onely open the pores and paſſages thereof, but alſo make the bloud to boyl, and bubble as Water doth over a fire; in ſo much that when the conſtitution thereof is looſened and rarefied the ſweaty vapours fly out in great quantities. Nor is it the external heat alone, but even our own, which being detained about the ſurface of that body, from whence it exhaled, cauſeth ſweat. For nothing is more uſual than for a man when he lies in bed, being covered with a great many cloths, to fall into a ſweat. The reaſon of which is plain enough, in as much as the vapours or breathings which juſt then come from him, and are reſtrained or kept in about the ſurface of his body, have the nature of a dry Bath.

3. Hindering of uſual Tranſpiration.

3. The hindering of uſual Tranſpiration doth ſometimes cauſe ſweating; and the reaſon of which is, becauſe the bloud being reſtrained from its free and uſual perſpiration, fermenteth more violently, like new Wine put up too cloſe in any veſſel; and conſequently being the more rarefied, and put into a great commotion through its more rapid circulation, muſt of neceſſity be diſſolved into Sweat. It was anciently a cuſtom among the *Iriſh* when they were ſick of any Fever, to wrap themſelves up in woollen clothes, moiſtned with cold Water, by which means great quantity of Sweat came from them, and oftentimes cured the Diſtemper. I have heard of ſuch an Experiment as this, that hath been tried upon our Country People with good ſucceſs.

4. Hot things taken inwardly.

4. Hot Meats inwardly taken, eſpecially ſuch as are ſeaſoned with Salt, Pepper, and Spices, and ſo alſo drinking of hot Waters, ſtrong Ale, and generous Wine, in as much as they either impregnate the bloud with active particles, which are like Spurs or Gladflies to it, or ſupply it when it is inflamed with Sulphur and ſuch combuſtible matter, which is like Oil to a Lamp, they cauſe a more copious perſpiration of the exhala-

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ble matter, and consequently greater exsudations or sweatings out of the superfluous *Serum*.

The difference of Sweats.

So much of the Nature and Causes (as well conjunct as manifest) of Sweat. As to the differences of it, it uses to be distinguished several ways; to wit, that is either spontaneous or forced; either partial, or universal; either critical or symptomatical; the reasons of all which are very manifest from what I have already said.

The causes of a cold Sweat.

Moreover Sweat is either hot, of which I have treated hitherto; or actually cold, such as is caused by a Panick fear, very sharp pains, in a Lipothymie, or any sudden fainting of the spirits, and in the pangs of death. The cause hereof seems to consist in the whole Souls sinking upon any sudden and extraordinary passion, whereby it contracts its circumference; and consequently, when the spirits are put into a consternation, and the bloud retracted with the heat toward the heart, the outmost particles that flow out through the skin, being left or forsaken by those that follow, and destitute of heat, are immediately condensed into a cold vapour just as it usually happens in Distillation. For if you restrain, or put out the fire on a sudden, the hot exhalation, that fills the Still, will presently turn to a Water.

How Sweating Medicins ought to be qualified.

From these things thus premised and demonstrated, which are the chiefest requisits to provoke sweating, and the great occasions, or ordinary accidents upon the account of which it is usually excited; it will not be any difficult matter to shew you in what qualities and particles sweating Medicins ought to excel, and after what manner they produce their effects. And first of all, as to their Virtues, Sweating things that are to be taken inward ought to be such as may make the bloud boyl up more than ordinary, and by consequence, evaporate; and likewise such as may in some measure open and dissolve the mass thereof, which is oftentimes too compact and thick; so that the serous part thereof may the more easily separate and run away; and at the same time may dispose it when so separated for evacuation by sweating, rather than by urin or stool. These are two things that are primary Requisites or Indications to Sweating; for the right accomplishing whereof, Diaphoreticks or sweating Medicins of several kinds and operations are commonly used. As to the third Requisit (which I mentioned before) to wit, the opening of the Pores, it is performed almost by outward Administrations onely; but after what manner, and how many ways it is usually brought about, I shall shew hereafter. In the mean time, to speak of Hidrotick or sweating Medicins that are to be taken in at the mouth, I must first shew you, after what general manner such Medicins work; then with what difference and particular kind of operation; and lastly, by virtue of what qualities, in every kind, to wit, either of the whole mixture, or any one single element, that is to say, a Spirit, Sulphur, or Salt, they exert their powers both in the bowels and in the humours, when they provoke Sweat.

The general reason of their operation.

1. Therefore as to the first, concerning sweating Medicins in general, I observe that they consist of such particles, as being benign enough to the Stomach and Guts, do not cause in them any convulsion or motion to stool: and likewise that they cannot be subdued by them, or astimilated as food may be; but when they come into the stomach, immediately dispose both the animal spirits and the bloud to sweating. For some of them being drowned and dissolved in the stomach, do presently rouze and recreate the animal spirits that abound within the nervous fibres (out of which the inner coat is made) in so much that the substance of the whole sensitive soul being presently erected, and expanded or spread to a larger circumference, makes the heart more vegete and active, and consequently the bloud, which is rarefied and more inkindled, more rapidly to circulate, by which means it is put into a Sweat. Moreover, in the mean time the particles of the same Medicin convey themselves also into the bloud that runs through the stomach-vessels (which cover the nervous tunick or coat in great numbers) and force it (by putting it in a ferment and a sudden heat) to make its way through the Veins toward the heart with far greater speed than ordinary: into which when it comes with that violence, immediately the pulse of the heart is augmented, and the whole mass of bloud being rarefied and more inflamed, and at the same time disturbed by the particles of the Medicin that are most intimately mixed with it, it is hurried on through the arteries with far greater speed into all outward parts; where, seeing all its watery part cannot be brought back or received by the veins and other conveyances, it must of necessity come to pass, that a great part of the serous humour be melted into Sweat. But the particles of the sweating Medicin, being admitted, as is aforesaid, into the bloud, do not onely ferment and disturb the liquor thereof, but oftentimes also do so loosen and open the misture of it, that the *Serum* and other dreggy parts of it are the more easily separated and thrown off. But since this happens to fall out after a different manner, not onely according to the various con-

conſtitution of the bloud, but the ſeveral operations or preparations of the Medicin, it ſeemeth worth our while in this place briefly to give you the various Indications when you ought to uſe ſweating Phyſick, and the different ways of proſecuting them, together with the reaſon of every one of them. But upon this ſubject you muſt firſt take notice, that ſweating Medicins are, in the ways of their operations, and the operation it ſelf very nearly allied to a great many Cordials (as they are commonly called) in ſo much that many of both ſorts are of the ſame or reciprocal uſe; and therefore ſeeing they differ chiefly in their greater or leſſer efficacy, as often as you have need to paſs from one kind to the other, it will be almoſt onely neceſſary to augment or diminiſh the Doſe, and to chuſe the moſt convenient times to give it in.

Sweating Medicins are like Cordials.

Therefore, as to the various kind and preparation of the matter out of which Hidrotick or ſweating Medicins are compounded, they are moſt commonly either the Integral or Elementary parts of ſome mixt body: that is, they are either natural bodies, that are given in their whole ſubſtance, either ſimple or extracted; as when the Leaves, Seeds, or Roots of Carduus, Contrayerva, Angelica, or the like, are taken in a Powder, Decoction, Conſerve, or Magiſtery: or elſe ſweating Medicins conſiſt of the particles of this or that Element, which are ſpirituous, ſulphureous, ſaline, ſimple, or any other that predominate therein: as if you extract out of Carduus, or any other body, whether Vegetable, Mineral, or Animal, a Salt, or Spirit, or Oil, and reduce it apart by it ſelf, or with other preparations, into the form of a Medicin. I ſhall briefly touch upon each, or at leaſt, the chiefeſt ſorts of them.

The matter of Hydroticks is either the integral parts of a mixt body;

Or Elementary.

I. *Diaphoreticks*, whoſe virtue conſiſts in the Integral particles of the whole concrete body, being unequally mingled, ſeem to excel in one particular Element, (that is, Salt) above all others, and to owe their virtue chiefly to that. But that Salt, upon which the Hydrotick or ſweating quality depends, comes in double capacity; for in ſome bodies it is volatile, ſharp, or bitter; and in others Alchaliſed, or in ſome meaſure fixed. 1. In the firſt rank are placed many Vegetables, which the Ancients counted Antidotes, as the Leaves of Scordium, Carduus, Scabious, and Vincetoricum, or Celandine, Marigold, and Camomile Flowers, Lagwort, Zedoary, and Galangal roots, &c. as alſo the Confections of Mithridate, Treacle, Diaſcordium, and likewiſe Decoctions of Guaicum, Box, and ſuch like. Which kind of Medicins, when taken into the Stomach and diſſolved, make a Tincture, whoſe particles (as being more hot than ordinary, and exotick or foreign) rouze up the animal ſpirits, whereby the heart being more vegetely actuated, drives about the bloud with a more rapid motion. Beſides which they get into the bloud that is in the ſtomach veſſels, and ferment it, and by that means, whileſt they cauſe it to be brought back to the heart by the veins in more than ordinary haſte, they are alſo the occaſion that it is driven forward ſo vehemently through the Arteries into the habit of the body, and cauſeth ſweating. 2. The other ſort of Diaphoreticks, or ſweating Medicins, which conſiſting of the integral parts of a mixt body, have an alchali Salt predominant in them, are Stones, and the bony or harder and ſhelly parts of Animals and Vegetables, as Bezoar, Pearl, Eyes and Claws of Crabs, and the like, whoſe Diaphoretick virtue proceeds moſt chiefly from an Alchali Salt; in as much as the particles thereof meeting ſometimes with an acid Salt, not onely in the bowels, but in the bloud too, and boyling up with it, do thereby cauſe the maſs of bloud to diſſolve, and the ſerous part thereof to ſeparate and melt into Sweat.

1. *Thoſe of the former ſort.*

How they operate.

II. *Hydrotick Medicins*, which after a Chymical reſolution of them, owe their virtue to Elementary particles, one way or other, being formed out of various ſubjects, and with different ways of preparation, are chiefly either ſpirituous, or ſaline, or both together united among themſelves, or with ſome ſmall number of ſulphureous particles. For thoſe that are meerly or for the moſt part ſulphureous, are leſs ſerviceable to this purpoſe; for ſuch being moſt commonly offenſive to the Bowels, do oftentimes cauſe nauſeouſneſs, and very frequently vomiting. Moreover ſuch as, through their great quantity of Sulphur are oily and fat, do not ſo eaſily inſinuate themſelves into the maſs of bloud. After what manner, and by what ſort of operation upon the ſpirits and the bloud, thoſe others cauſe ſweating, I ſhall enquire more particularly.

2. *Hydroticks whoſe particles are Elementary, of what kind, and how many fold they are.*

1. And firſt to the ſpirituous ſort of them I refer hot Waters, and all kind of liquors that are impregnated with a Vinous ſpirit; ſuch as are Chymically diſtilled every where out of the Fruits of Vegetables, or their Juices ripened by fermentation, or diſſolved by putrefaction; ſuch as are Spirit of Wine, Cider, Ale, Juniper berries, Elder, Black Cherries, with many other things, which are commonly called ſpirits; and they are taken either plain and clear by themſelves, or being impregnated with the infuſion of other Simples, are again diſtilled, or given under the form of a Tincture.

1. *Spiretuous ones.*

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ćture. Theſe kind of Vinous liquors, being inwardly taken, cauſe ſweating, not onely in that they erect or raiſe the animal ſpirits, and put them into a greater expanſion (whereby the motion of the heart alſo is quickened) but likewiſe for that they put the bloud into a commotion and (juſt as when Oil is added to a flame) make it more hot and fiery. For the ſame reaſon, and upon the ſcore of the ſame manner of operation that theſe are called Diaphoreticks, they uſe alſo to be called Cardiacks or Cordials, if they are given in a leſſer doſe.

2. Salt ones.

2. For cauſing of Sweat there are Salt Preparations of ſeveral kinds and different qualities, which are uſually preſcribed, and that with good ſucceſs; which nevertheleſs do not (as the particles of the whole mixt body, or thoſe that are meerly ſpirituous) either diſturb the bloud through their heterogeneouſneſs [for being of another kind] or kindle it through their inflamableneſs [or being eaſily ſet on fire] but onely by acting upon the ſaline particles thereof; which whileſt they ſnatch into their embraces, they ſever them from their ſtrict union with others, ſo that the conſtitution of the bloud being looſened, and the Pulſe augmented, the ſuperfluous ſerous parts and other dregs, do the more eaſily ſeparate, and arecarried off by Sweat. To this place you may refer (as I have before ſhewn concerning Piſſing Medicins, and likewiſe in Cordials, as ſhall hereafter appear) Salt of almoſt every kind, but eſpecially volatile, fluid, fixed, and nitrous Salt; out of which either ſeverally, or in compoſition with each other, Diaphoreticks of the chiefeſt note are made: which being inwardly taken and meeting with other Salts that abound both in the bowels and in the maſs of bloud, and drawing them from the embraces of the other particles, do open and rarifie the bloud, and conſequently diſpoſe it for evacuation by ſweat. We ſhall hereafter declare to you the chief ſorts of them, with their manner of operation; but in the mean while, ſeeing the ſame ſalt Medicins that uſe to be given for ſweating, are alſo commonly preſcribed to provoke Urin, and ſometimes for Cordials too, I muſt ſhew you with what preparation, and alſo with what requiſits we ought to proſecute this manner of evacuation by ſweat apart from thoſe other intentions.

How they work.

The ſeveral ſtates of their ſaline particles.

How Sweats ought to be adminiſtred.

And indeed we obſerve, that ſweating Medicins taken inwardly do ſeldom or never work of their own accord, as Vomits, and Purges, or Diureticks do; and beſides that, a man muſt always uſe great caution, and keep ones ſelf warm, to actuate the Medicin, and to determine that operation. Wherefore, from the time that the ſweating Medicin is given, the Patient is to be treated in that manner, to the end that not onely the Pores of his body may be opened, but alſo very much to quicken the pulſation of the heart. For theſe ends, let him be kept in a warm Bed, a Bath, or Hot-houſe, or exerciſed with a ſwifter or more laborious motion of his Body than uſual; all which, that it may the better ſucceed toward the provoking of Sweat, we muſt chuſe the moſt convenient time and ſubject, as oft as it is in our power; that is to ſay, when the bloud being in a good temper, or at leaſt, not a very bad one, doth both ſufficiently abound with ſerous humours, and is not too confuſed or diſturbed in its particles, but is inclined to open, and ſeparate, or be diſſolved into ſeveral parts. For in a cholerick temper, a thin and dry conſtitution, and in the midſt of a burning Fever, when all things are out of order and indigeſted, Diaphoreticks are oftentimes given in vain, or when they are not proper. Moreover as often as they ſeem to be uſeful, you muſt not give any kind of them indifferently; but according to the ſeveral conditions of the bloud, and the different predominancy of ſometimes this and ſometimes that Element therein, and the ſtates or qualifications of the Salts, you muſt make choice of ſuch and ſuch Medicins. To this purpoſe we ſhall in the next place tell you, with what caution, and in what forms they ought to be preſcribed.

Time and Subject muſt be choſen moſt convenient for ſweating.

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CHAP. II.

The Sorts and Receipts of Diaphoreticks [or Sweating Medicins] with the Reasons of some among them which are Chymical.

SEeing that Sudorifical or sweating Medicins are manifold and of different sorts, and use also to be variously ordered and reduced into Classes or ranks; I therefore thought fit in this place first of all to give you an account of, and distinguish the same both in their form or manner of making, and also as to the matter of which they are made. Now the most usual forms in which they are given, are 1. a Powder, 2. Chymical Liquors. 3. A Potion. 4. A Bolus. 5. A Diet. The matter of every one of these is either the integral parts of a whole mixt Body, or they are the elementary parts of some mixed Body resolved and taken in pieces by Chymistry: and those are either more simple (that is to say, either spirituous or saline (which latter are either volatile or fixed, or sower or nitrous) or the sudorifical particles, so divided and separated by Chymistry, are elementary ones compounded among themselves; to wit, spirituo-saline ones, and salino-sulphureous ones. Whilest we run over each of these sorts in order, we will adapt or fit, to every kind of matter, the more select forms of prescriptions.

What are the Forms of Diaphoretick Medicins.

1. Diaphoreticks whose foundations are the integral parts of a mixt Body, and such wherein a sharp or volatile Salt predominateth, conduce oftentimes to the provocation of sweat upon this account; to wit, that their particles being admitted into the bloud (seeing they are unmingleable and untamable) disturb the mass thereof, divide it very much, and separate it as it were into small parcels; in so much that at last when the constitution of the bloud is very much loosened and put into a boyling heat, the serous superfluities, the dreggy parts and corruptions of the bloud are thrown out along with the particles of the Medicin, which are to be cast forth upon the score of their heterogeneousness [or being of another kind.] Those of this sort are used to be given under the form of a Powder, Bolus, Potion, and Diet, according to the following prescriptions.

Such as have the integral parts of a mixt body for their basis.

The Receipts of them.

Powders.

Take of the dust of the roots of Contrayerva, Virginy-Creeper and Lagwort, each ℥ j. of Cochineel and Saffron, each ℥ ß. make a Powder. The Dose is ℥ ß. with a convenient vehicle.

Take of the Powder of Vipers ℥ j. and give it in a convenient Liquor.

Take of the Powder of Toads prepared ℥ ß. to ℥ j.

When Diaphoreticks ought to predominate with an alchali Salt alone, or mingled with the former;

Take of Eastern Bezoar ℈ ß. to ℥ ß. and give it in a spoonful of distilled Water, or of any other vehicle.

Take of the Powder of Crabs Claws compound. ℈ j. to ℥ ß. and give it the same way.

Make your Powder of Bezoar in this manner following:

Take of the Powder of the Roots of Contrayerva, and of Crabs Claws, simple, each ℥ ij. of Pearl, both sorts of Coral, of the whitest Amber, of Crabs Eyes, Harts horn, and Chrystal prepared, each ℥ j. of Western Bezoar, and of Terra Lemnia, each ℥ ß. of Cerus's of Antimony ℥ ij. of Cochineel ℥ ß. of Amber grise ℥ j. ß. of Musk ℥ ß. make a small Powder, and form it, with Gelly made of Vipers skins, into little Balls. The Dose is ℈ j. to ℥ j.

Take of this Bezoar Powder ℈ j. of Toads prepared, gr. vj. make a Powder, and give it in a spoonful of Treacle water.

2. Bolusses, the bases or foundations of which are the integral parts of a mixt Body, reduced into the form of a Confection, Extract, or Conserve.

2. Bolusses.

Take

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Take of Mithridate ʒ ß. *to* ʒ j. *of Powder of Bezoar* ℈ j. *to* ʒ ß. *Syrup of the juice of Citron a convenient quantity; and make a Bolus. In place of the Mithridate you may put Treacle or Diascordium, or Confectio liberans de Hyazintho. So Bezoar pulverized, or Powder of the roots of Contrayerva, or of any other things like unto it, may supply the room of the Powder of Bezoar.*

Take of the Extract of Treacle ʒ ß. *to* ʒ j. *of the Powder of Bezoar* ℈ j. *and make a Bolus.*

Take of the Extract of Carduus ʒ ß. *of the Powder of Bezoar* ℈ j. *of Salt of Wormwood* gr. xv. *with a convenient quantity of Syrup made of the juice of Citron; and make a Bolus.*

3. Potions. 3. Potions whose Foundations are the common Decoctions of Vegetables, or Infusions and Tinctures.

A Decoction. *Take of the Roots of Lagwort* ʒ j. *of the Seed thereof* ʒ ij. *of Candied Ringo root* ʒ vj. *of Carduus seed* ʒ ij. *and boyl them in Spring water, one pint to half a pint, in the clear straining whereof take* ʒ ß. *or* ℈ ij. *of Mithridate, warm in bed.*

In like manner take the Leaves of Carduus, Marigold or Camomile Flowers, and boyl them in a convenient quantity of Posset drink. Of which give ʒ vj. *or* viij. *warm by it self, or with a Powder, a Confection, or any other Diaphoretick joined to it.*

Infusions and Tinctures. 4. Several sorts of Diaphoretical Infusions and Tinctures may be prepared by extracting the Vertues of simple Vegetables, and of Confections with Wine, Vinegar, or destilled Water: which being afterward strained and clarified by setling, are oftentimes very successfully given either by themselves or in composition with other liquors. Hither we ought to refer all Waters, Wines, and Venegars of Bezoar, prepared by Infusion, the Receipts whereof are very frequently met with among Authors. Moreover the Tinctures of Vegetables, that are very efficacious in a small Dose, are made in this manner following.

Chymical Tinctures. *Take of the roots of Contrayerva* lb j. *and when you have bruised it and put it into a Matrace, pour to it of spirit of Wine three pints. Let them digest to extract a Tincture, which you must strain, and let it evaporate in a Bath to the consistence or thickness of Honey. Keep the spirit which you first drew off, apart from the rest, and pour it again into the remaining part of it: and then again extract a Tincture: of which the Dose is* ʒ ß. *to* ʒ j. *in a convenient vehicle.*

5. Diets. 5. Diets, the bases or foundations whereof are Decoctions of Liquors, designed for the cure of the Pox, and some other chronical Distempers, deeply rooted in the bloud and humours.

For, to the curing of some Diseases very violent and frequent Sweating, that is, a long time together, and every day, is necessarily requisit: not onely to purge out the impurities and corruptions of the Bowels and Humours, but also totally to extinguish, or as it were, root out the morbifick tinctures, that are so deeply impressed upon them. To this end, it will not be enough to give a Sweating Powder or Bolus some few times, but a mans whole Diet ought to be directed to this end onely: wherefore all ones drink in such a case ought to be a Diaphoretick Decoction, after a Dose whereof taken in the morning, you must sweat plentifully either in a Bath or Hothouse. Then, when by this means both the pores of the skin are opened, and Nature also is inclined to an evacuation by Sweat, let the recrements of the bloud and nervous juice evaporate all the day after by transpiration, which must be still continued by the use of the same drink. By this method not onely the Pox is most safely and for the most part most certainly cured, but likewise other Herculean Distempers are sometimes happily healed.

Take of the shavings of Lignum Sanctum, or Guiacum ʒ iv. *of Sarsaparella* ʒ vj. *of China* ʒ ij. *of all kinds of Sanders, each* ʒ j. *of the shavings of Ivory, and of Harts horn, each* ʒ ß. *of Antimony pulverized and tied up* ʒ vj. *infuse them according to Art, and boyl them in* xvj. *pints of Spring water till half be boyled away; then strain it, and to the dregs of the Ingredients that remain, pour a like quantity of water, and make an Infusion and a Decoction till a third part be consumed, adding of Raisins* lb j. *of Licoris* ʒ j. *and keep the straining for your ordinary drink.*

In

In a cholerick temperament, and when the bloud is ſharp and hot, you muſt omit the Guiacum, increaſing the quantity of China and Sarſa. *Pharm. Rat.* Part I.

Diaphoreticks that conſiſt of the integral part of a whole mixt body, and are eaſily got for the Poor, muſt be prepared according to the Receipts following. *Diaphoreticks that are eaſily got.*

In malignant Fevers. *Take of Conſerve of Allelujah* ʒ j. *and of Mithridate* ℈ ij. ß. *mingle them, and let the Patient take them, drinking thereupon a draught of Poſſet drink, with Carduus or Scordium Leaves, or Camomile, or Marigold Flowers boyled in it.*

Take of the roots of Virginy Creeper pulverized ʒ ß. *to* ʒ j. *and give it in a convenient vehicle.* Or, *Take of the roots of Lagwort pulverized* ʒ j. *after the ſame manner.*

In ordinary caſes give *the Decoction of Grumwel, roots of Lagwort, or Virginy Creeper, or roots and ſeeds of Burdock.* In the Pox, *The Decoction of Sopewort or Shavings of Box wood, and the like, may ſupply the place of the Decoction which is made of Woods that are of greater value.*

2. Sweating Medicins prepared out of the elementary parts of a mixt Body, have for their foundation either a Spirit or a Salt, ſometimes ſimple, and ſometimes joined with another Salt or with Sulphur. Spirituous Medicins muſt be preſcribed according to the Receipts following. *Forms of Chymical Diaphoreticks.*

1. *Spirit of Treacle camphorated* ʒ ß. *to* ʒ j. *or* ℥ j. ß. *may be given in a convenient vehicle.* *1 Such as have ſpirituous particles for their foundation.*

After the ſame manner alſo many other Spirits, diſtilled out of the juices of Vegetables that are ripened by fermentation, and appropriated to ſome certain Diſtempers, may be given to provoke Sweat at any time when it is proper: ſuch as are the ſpirit of black Cherries, of Elder, Ivy, and Juniper, berries, with many others. Spirit of Harts horn, Soot, Bloud, and the like, ought rather to be reckoned among the ſaline Medicins.

2. Diaphoreticks whoſe foundations are Spirits, with other elementary particles mixed among them, muſt be preſcribed in this manner; *2. Such as have ſpirituous particles united with others.*

Take of the ſimple mixture ʒ j. *and give it in a convenient vehicle.*

Hither alſo you may refer ſuch as conſiſt of a Spirit, fixed Salt, and Sulphur united: ſuch as are the Tincture of Salt of Tartar and Antimony, of which the Doſe is ℈ j. to ℈ ij. in another liquor. Moreover Diſtilled Waters, in which the ſpirituous particles are diluted with watery ones, are oftentimes uſed to be given to provoke ſweat with very good ſucceſs.

Take of the Roots of Lagwort, and Valerian, each ℥ ij. *of Zedoary, Contrayerva, or Drakes Root, and Virginy Creeper, each* ℥ j. ß. *of the Flowers of Lagwort or Butterbur* iv. *handfuls, of Saffron* ʒ ij. *to which when ſhreded and bruiſed pour* iv. *pints of Sherry Wine; diſtil them according to Art, and mingle all the liquor. The Doſe is* ℥ ij. ß. *to* ℥ iij. Or, *Take of the roots of Angelica, and Maſterwort, each* ℥ iv. *of Zedoary, Elicampane, Swallow wort, Gentian, and the leſſer Galingal, each* ℥ j. *of the tops of Carduus, Rue, and Angelica, each* iij. *handfuls, of the middle Bark of an Aſhtree* ℥ vj. *when you have ſhreded and bruiſed them, put to them of Mithridate, and Treacle of Andromachus, each* ℥ ij. *mingle them, and pour to it of generous Wine* vj. *pints, of diſtilled Vinegar* ij. *pints, diſtil them according to Art. The Doſe is* ℥ iij. *Diſtilled Waters.*

The Doſes of the aforeſaid Waters may be actuated by the addition of Chymical liquors or ſalts. Such Medicins as theſe that are impregnated with a vinous ſpirit are proper chiefly and almoſt onely for old men, and likewiſe for ſuch as are of a cold temper, and thoſe that are ſubject to a Palſie or Dropſie; but in an hot conſtitution, and when the Bowels burn, or the Bloud is in a feveriſh commotion, they uſually do more hurt than good, in as much as they inflame the former, and put the latter into an exceſſive effervescence.

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3. *Those whose basis is Salt.*

Diaphoreticks whose basis is saline, as they are of several sorts, to wit, (according as the salt is volatile, fixed, sower, or nitrous, so they are) of a different use and operation; which is the reason that in some cases one sort, and in other cases another sort is more proper; as I observed before concerning Diureticks, or Pissing Medicins.

1. *Such as consist of fixed or volatile Salt.*

1. Fixed and volatile Salt are most proper for those, whose Bloud abounds very much with a serous humour. So also, when the juice that moistens the bowels and the nerves, grows sharp, (as it is usual in those that have the Dropsie, or an ill habit of body, and such as are liable to convulsions) those kind of Medicins are more successfully used to provoke sweating; but, when they meet with the acid-saline particles of the humours, and are united thereunto, they loosen the constitution of the Bloud, and likewise through the heterogeneousness (or different ingredients) of the mixture, disturb the mass thereof, and therefore to the end that the serous parts of it may be the more easily separated, and driven outward through the pores of the skin, those Medicins are prescribed in the form of a Powder, a Bolus, and a Liquor.

Their Forms or Receipts. Powders.

Take of the Flower of Sal Armoniack ℈ ß. *of Chrystal Mineral* gr. xv. *of Bezoar Powder* ℈ j. *mingle them, and give it in a spoonful of Aqua Sudorifica or Sweating water.*

Take of Salt of Tartar ℈ j. *of Ceruss of Antimony* gr. xxv. *and make a Powder, to be given the same way.*

Take of Bezoar Powder Mineral ℈ j. *to* ʒ ß. *of Gascoign Powder* ℈ j. *make a Powder, and give it in the same manner.*

Take of Ceruss of Antimony ℈ j. *to* ʒ ß. *of the Flower of Sal Armoniack* ℈ ß. *and make a Powder.*

2. These Medicins may be given in the form of a Bolus, by mingling the aforesaid Doses with Treacle, Mithridate, or Diascordium, or with the Extract of Carduus, Gentian, or the like.

Bolusis.

Take of Bezoar Powder Mineral ℈ j. *of Flower of Sal Armoniack* gr. vj. *and of Mithridate* ʒ ß. *make a Bolus.*

Take of Salt of Harts horn gr. viij. *of Bezoar Powder* gr. xv. *of Extract of Treacle* ℈ j. *make a Bolus or* iij. *Pills.*

3. If it be more convenient to take them in the form of a Liquor.

Liquors.

Take of Spirit of Hartshorn or Soot, or Sal Armoniack from xv. *to* xx. *drops, of Aqua Sudorifica* [*or Sweating water*] ʒ j. *to* ʒ iij. *make a potion, and let the Patient take it with caution, keeping within doors.*

Take of the Flower of Sal Armoniack ℈ ß. *of Salt of Tartar* gr. xv. *of Aqua Sudorifica* ʒ iij. *mingle them and make a draught.*

Such whose basis is nitrous Salt.

4. Diaphoreticks that have a nitrous Salt for their basis or foundation, are used with success in almost the same cases, as the former, which are composed of fixed and volatile Salt; in as much as they destroy the predominancy of the acid Salt, and so dispose the mixture of the Bloud, that whilest it boyls up, the *Serum* and dregs thereof may be the more easily separated and carried off.

Take of Chrystal Mineral ʒ iij. *of Salt of Hartshorn, or Soot, or Vipers* ʒ j. *mingle them. The Dose is from* ℈ j. *to* ʒ ß. *in a convenient vehicle.*

Take of Sal Prunellæ ʒ ij. *of Bezoar Mineral Powder or of Ceruss of Antimony* ʒ j. *make a Powder. The Dose is* ℈ ij. *to* ʒ j.

Those whose basis is an acid Salt.

5. Diaphoreticks whose basis is an acid Salt, are of greatest efficacy against the predominancy of fixed Salt and Sulphur: that is to say, When the mass of bloud is too thick and tenacious by reason of the saline-fixed particles which are united with the sulphu-

ſulphureous and earthy ones, ſo that it will not eaſily allow the ſerous parts of it to be carried off by Sweat (as it uſually happens in continued Fevers and the Scurvy) an acid Salt, in the Medicin which is given, meeting with a fixed Salt in the body, and forcing it into its embraces, deſtroys the hurtful unions thereof, and conſequently looſens the boyling bloud, and diſpoſeth it for ſweating.

Potions.

Take of Spirit of Tartar from ʒ ß. *to* ʒ j. *of Aqua Sudorifica* ʒ iij. *of the Flower of Sal Armoniack* ∋ ß. *mingle them.*

Take of the Simple Mixture ʒ ß. *to* ∋ ij. *and give it in a ſpoonful of Treacle or Bezoar water.*

Take of Bezoar Vinegar from ʒ ß. *to* ʒ j. *of Carduus water* ʒ ij. *of Plague water* ʒ vj. *mingle them and make a draught.*

Take of Spirit of Guiacum ʒ j. *of Aqua Sudorifica* ʒ iij. *mingle them and make a Potion.*

Sulphureous Diaphoretick.

5. Some things that are meerly or for the moſt part ſulphureous are commonly reckoned among Sweating Medicins; as ſome natural Balſams, and others that are made, as alſo Chymical Oils, and eſpecially thoſe of Guiacum, Box, Camphire, Harts-horn and Soot; ſo likewiſe the roſinous Extracts of ponderous Woods, with many other things, which though by themſelves they are of little efficacy toward provoking of Sweat, yet when they are joined with other ſaline ingredients, I am of opinion that they are not altogether uſeleſs; in as much as in a cold and phlegmatick conſtitution, ſulphureo-ſaline things rarifie the bloud when it is too wateriſh, and diſpoſe it to a freer evaporation, as much as ſpirituous things do.

Take of Balm of Gilead from vj. to xij. *drops, of water of Baum, or of Ground Ivy* ʒ iij. *of Aqua Sudorifica* ʒ ß. *and let the Patient take it every morning for ſeveral days together, to ſweat. It is proper for thoſe that are Pthiſical, or have Ulcers in their Reins.*

Upon the ſame account, but in a larger Doſe, you may give Balſam of Peru, and likewiſe Tincture of Balſam of Tolu, as alſo ſtillatitious Balſams compounded.

Pills.

Take of Roſin of Guiacum pulverized ʒ ij. *of chymical Oil of the ſame* ∋ j. *of Bezoar Mineral and of Gum of Guiacum each* ʒ j. ß. *of Balſam of Peru, a convenient quantity: make a maſs for Pills. The Doſe is from* ʒ ß. *to* ∋ ij. *drinking thereupon a Doſe of Aqua Sudorifica, or Decoction of the Woods.*

The Chymical preparations of ſome Diaphoreticks, with the reaſons why they are ſo made.

Bezoar Mineral.

The Preparation of Bezoarticum Minerale.

Take of Butter of Antimony rectified ʒ iij. *pour to it drop by drop of the Spirit of Nitre, or Aqua Stygia an equal quantity; draw it off in the heat of Sand, and pour it thereunto again, adding of the ſame menſtruum freſh* ʒ j. *and draw it off again, repeating it three or four times. When you have taken the matter out and pulverized it, calcine it for an hour in a crucible; then ſweeten it by waſhing, and burning Spirit of Wine upon it for three or four times. The Doſe is from* ∋ j. *to* ʒ j.

The reaſon of it.

In the preparation hereof it is worth our obſervation, that whileſt theſe exceeding ſharp liquors are put together, immediately the Salts meeting with each other, are ſtrictly united; in the mean time the ſulphureous particles which abound in it, being totally excluded and freed, fly away, and taking ſome ſaline particles along with them, cauſe a very offenſive heat and ſmoak, as if ſomething were actually a burning: then when theſe are driven away, the ſaline ones that are left behind, are more cloſely united with ſome earthy ones of the Antimony, and at laſt having undergone the fire, that the Emetick or vomiting Sulphur may totally exhale, and the corroſive ſharpneſs of the Salts be rebated, they make an excellent Diaphoretick; in as much as the different Salts in this Medicin, meet with the Salts in our Bodies, to which whileſt they are united, the union of the bloud and humours is diſſolved, ſo that the way whereby for

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the ferous recrement to pass out is wide enough; in the very same manner, as when Spirit of Nitre poured upon Butter of Antimony, or *Aqua Fortis* upon the filings of Iron, causeth a great ebullition or bubbling with heat and black fume; the reason of which is, because the sulphureous particles (whilest the Salts unite) fly away in great quantity as from a kindled fire. And that actual flame is not caused in this case, the reason is, because a great many salt particles arise with the sulphureous ones, by which the sulphureous ones are every where separated from each other, lest coming together they might take fire and flame.

Bezoar Mineral is said to be made after a more compendious way, in this manner:

You must precipitate Butter of Antimony infused in Spring water, into a white Powder, called Mercurius Vitæ: *which being dried, you must put by little and little into Salt of Nitre, melted in a crucible, and let them flow together for a quarter of an hour. After that, when the Nitre is dissolved by frequent pouring Spring water upon it, a white and fixed chalk will remain. Which nevertheless, though it be used for a Diaphoretick, differs very much from the Bezoar Mineral, because in it the Salts of the menstruums, upon which the virtue of the Medicin very much depends, are almost quite washed away: Besides that comes nearer to the nature of Ceruss of Antimony, or rather seems to be the same thing with it.*

2. Diaphoretick Antimony.

Antimony Diaphoretick.

Calcine your Antimony twice or thrice, with an equal quantity of Nitre, then melting it in a crucible, either let it run for some time, or throwing in a coal, let it make a noise till such time as the Sulphur being quite spent, a calx remains, consisting in a manner onely of Salt and Earth, and impregnated with fiery particles: which, when it is sweetened (as the way is) with frequent washing, becomes a meer Caput mortuum, *or insipid Earth.*

The reason of it.

And although it be stiled by the name of a Diaphoretick, yet I know not to which of its particles that virtue can be attributed; and I have often in vain expected such an effect from this Medicin. It is indeed often used with good success to stop fluxes of the *Serum* or the Bloud; because this Earth being bereft of its proper Salts, imbibes other strange sorts of acid Salts, which it by chance meets with in our bodies; the like operation to which *Crocus Martis* seems to have (being prepared by a reverberating fire) and from the like cause, as I have elsewhere hinted to you.

Ceruss of Antimony.

Ceruss of Antimony, prepared out of the purer part thereof, that is to say, Regulus calcined with Nitre, is onely the purer or more clarified calx of it. In the preparation whereof you add Tartar, because the Regulus hath but very little Sulphur (without which Nitre will not burn) in it; wherefore, for the better performance of the calcination, it is necessary to make an addition of Tartar, which abounds with sulphureous particles.

3. Flower of Sal Armoniack.

Flower of Sal Armoniack.

Take of Sal Armoniack pulverized ℔ j. *of filings of Iron* ʒ xij. *which having pounded and mingled, distil them in a Retort with a large neck, increasing the fire of the Reverberator by degrees: an yellowish liquor, which is the Spirit of Salt, will drop out into the Receiver, and the Flower will be sublimed partly into the sides thereof, and partly into the neck of the Retort, which being gathered together, may be kept in a Glass for your use. The Dose is from* gr. v. *to* xv.

The variation of this method.

This operation is performed by mingling Sal Armoniack with washed Colcothar, as also with the Calx or Salt of Tartar. The reason of which mixture is this; first, to keep the Sal Armoniack from fusion or running. Secondly, That when the Particles of the more fixed Salt adhere or stick to the Iron, Colcothar, or Calx of Tartar, the volatile parts of them being free from restraint, may easily ascend. And thirdly that the Flower, whilest it ascends, may carry along with it something of another body, to wit, of Mars, Venus, or Salt of Tartar, and be impregnated with the virtue of it. When the sublimation is performed with Iron or Calx of Tartar, there are Tinctures drawn out of each *Caput mortuum*, (with Spirit of Wine) which are of no small use.

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4. Spirit of Sal Armoniack.

4. *Spirit of Sal Armoniack.*

Take of Tartar calcined with Nitre, and of Sal Armoniack, each ℔ iij. *and when you have pulverized them severally, mingle them and put them into a large Cucurbit, pouring to them of Spring water* vj. *or* viij. *Pints, and distil them in an Oven of Sand. The Spirit will arise with the gentlest heat, pure, and very penetrating, without any burning: which if you rectifie it in a deep Cucurbit, a most pure volatile Salt will ascend into the Alembick.*

The reason of the operation.

The reason of this procedure is this: The Sal Armoniack consists of a volatile salt made out of Soot, Piss, and Sea-Salt; all which uniting, whilest they are sublimated, the salinovolatile particles being totally freed from the sulphureous ones, that used to stick to them, are so fixed and setled by the Sea-salt ones, that they cannot fly away. But as soon as ever this Bond is dissolved; that is to say, when this compound Salt, being dissolved in water, is intimately mixed with the salt of Tartar, the particles of Sea-salt stick close to the saline-fixed ones of the Tartar; and consequently the volatile ones being dismissed from their embraces, and ready to fly away, do very easily arise; but whereas the spirit distilled from Sal Armoniack hath no offensive smell, as liquors drawn from Soot or Urin have, the reason is, because in that composition the volatile Salt, by the intervening of the Sea-salt, is altogether deprived of any sulphureous particles; which, when Soot or Piss are distilled by themselves, stick fast to the volatile Salt (as appears very plainly from the ill odour of them both) and likewise because the liquors distilled from those bodies, being first clear and limpid, grow afterward of an yellow colour, and become at last red, and black, and opacous or dark; to wit, in as much as the sulphureous particles being first subdued and hid by the saline ones, get by degrees their liberty, shew themselves and predominate over all the rest.

The Spirit of Sal Armoniack hath no Sulphur in it as that of Harts horn, &c. hath.

And why.

But in that composition of Sal Armoniack, that the particles of Sea-salt, of Piss and of Soot drive away the sulphureous part and fix the volatile Salt, is very manifest even from this Experiment also, which the famous *Zwelfer* found out for the fixing of volatile Salt. For Example:

Take of the volatile Salt of Vipers, Piss, or Harts horn, as much as you think good; which when you have put into a Cucurbit with a streight, and saving one little hole, a close orifice, pour into it drop by drop the spirit of Sea-salt to the height of two or three fingers, till all the Salt be dissolved: then filtrate the dissolution, and draw it off in a cucurbit, till it be dry. There will remain in the bottom a Salt of a good smell, somewhat acid, and of a salt taste; the use whereof is very much cried up in several Distempers.

In this case I have tried and found yet farther, that if you would recover your volatile Salt, you must put Salt of Tartar to it, and sublimate it in a Glass; from whence there will arise a most pure volatile Salt. In this manner you may so rectifie Spirit of Soot, of Harts horn and Bloud, that when their sulphur is quite driven away, they may become more grateful and less corruptible Remedies.

That Spirit is distilled with slacked Lime and Lie of ashes

The Spirit of Sal Armoniack may also be distilled many other ways, to wit, if you mingle the dissolution of that Salt with a Lie of fixed Salt, or of slacked Lime in an equal proportion; for by this and perhaps some other means, whilest the particles of Sea-salt contract new confederacies, the former associates fly away. So it is also in the distilling of Piss, as is shewn in its proper place.

5. Spirit of Soot, Harts horn, &c.

5. *Spirit of Soot, Harts horn, &c.*

Take of heavy Soot that comes from burnt wood, and shines with a blackness like Pitch, a convenient quantity, so as to fill an earthen Retort above half full; then having fitted thereunto a large Receiver, begin the distillation with a reverberating fire, increased by degrees to a moderate heat; there will in a short time arise a spirit in a white fume, and then an yellow Oil with a volatile Salt, and lastly a blackish Oil. Gather the Salt by it self and rectifie the rest of the liquor when it is separated from the black Oil by filtration, distilling it in a Balneum Mariæ, or bath of sand, twice or thrice: so also when you have rectified the volatile Salt in a deep cucurbit, and purified it, keep it for your use. The Dose is of the Spirit from xij. *to* xx. *drops, and of the Salt from* vj. *to* xij. *or* xv. gr.

Small

Phar. Rat. Part I.

Small pieces or ſhavings of Harts horn may be diſtilled either the ſame way, with mere fire, or in a glaſs Retort and an Oven of Sand. So alſo out of a Skull, Bones, and Bloud, you may draw a Spirit, with a volatile Salt and a ſtinking Oil.

6. Spirits and Roſinous Extracts of Guiacum, Box, and other ponderous Woods.

6. Spirits of Guiacum, Box, and the like.

That theſe kinds of Woods are duly numbred among ſuch things as provoke Sweat, is plain from this, that ſudorifical decoctions are made chiefly of them. The Hydrotick [or ſweat-cauſing] virtue of them ſeems to conſiſt in not onely a ſaline, but a ſulphureous principle; for theſe Bodies are abundantly filled with ſuch kind of particles. Wherefore beſides the common manner of preparing them, by infuſion and boyling, their active principles of Salt and Sulphur are ſeverally drawn forth by a chymical reſolution, and being reduced into peculiar concretions, that is to ſay, either a Spirit, an Oil, or a Roſin, make very fine, pleaſant, and efficacious Diaphoreticks, or Sweating Medicins.

1. The Spirit and Oil are prepared in this manner.

Take of the ſawed duſt of Guiacum wood ℔ ij. *and diſtil it with a reverberating fire, or in an Oven of Sand with a ſtrong heat, there will come forth a ſharp, and ſomewhat acid liquor, and an oil that is yellow and black: ſeparate the latter and rectifie the reſt in a cucurbit, you will have a ſpirit that will be clear and ſharp to the ſmell, as alſo an yellow and ponderous oil, which will ſettle in the bottom of the watery Liquor. The Doſe of the Spirit is from* ʒ ß. *to* ʒ j. ſ. *and of the Oil from* vj. *to* xv. *drops in a convenient vehicle.*

The reaſon of it.

Both Medicins are Diaphoretical, and are uſed with ſucceſs in a Dropſie, the Scurvey, and the Pox. Without doubt the ſaline part of this Body, which is partly fluid, and partly volatile, together with the phlegm, makes up the Spirit ſo called; and the more pure ſulphureous part, the yellow Oil, which beſides that, through the quantity of ſalt that ſticks to it, is heavy and ſinks: Yea ſome ſulphureous particles ſtick faſt to the acid ſharp ſpirit or diſtilled liquor, in ſo much that it always ſtinks, and ſoon loſing its clearneſs, degenerates to an yellow or a red colour. The black Oil conſiſts of a ſalt and ſulphur that is thick, that is to ſay, mingled with a quantity of earth. In Guiacum the ſaline Element is, moſt part of it, elevated beyond fixedneſs, into a ſtate of fluidity and volatileneſs; which is the reaſon that a Lie made of the aſhes thereof, affordeth leſs Salt. It is quite otherwiſe in Tartar, whereof onely ſome of the ſaline parts are in a fluour, and a ſtate of volatility, but moſt of them remain fixed.

7. Roſin of Guiacum.

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Roſin of Guiacum is prepared after the ſame manner ar Roſin of Scammony or Jalap, that is to ſay, the Tincture is extracted with ſpirit of Wine, and then it is drawn off to the one half; and by pouring water into the cucurbit, the Roſin will deſcend in great quantity, which being dried and pulverized, may be given from ϑ j. to ʒ ß. with other Sudorificks in a ſolid Form.

The reaſon of it.

That this Roſin is the ſulphureous part of the Guiacum is manifeſt from this; that after the extraction of it, if you diſtil the remaining Magma [or dreggy part that is left] in a Retort with the heat of Sand, or Fire onely, you will have a phlegm and an acid liquor in the uſual proportion. Wherefore from this chymical reſolution [or taking to pieces] of this Wood, we may conclude that the chymical Elements (in the ſame number, and juſt ſo qualified, as I have elſewhere aſſerted) are in mixed Bodies, and that they are not onely ſeemingly produced by the operation it ſelf, as ſome men ſay.

8. Spirit of Tartar.

8. Spirit of Tartar.

Take of choice white Tartar that ſhines, waſhed and dried (or rather as Zwelfer *preſcribes diſſolved, and once chryſtallized)* ℔ iv. *diſtil it in a Retort with a large Receiver, increaſing the fire gradually, till the fumes are quite gone. You will have a phlegm, a ſpirit, an yellow and a black Oil; which laſt you muſt ſeparate; then put the remaining liquor into a glaſſen cucurbit, and rectifie it twice or thrice with the heat of Sand, abſtracting every time onely a third part. The Doſe is, of the Spirit, from* ʒ ſ. *to* ʒ j. *and*

and of the Oil ℈ β to ℈ j. which in a prepared Body provokes Sweat very powerfully. *Phar. Rat.* Part. I.

The Geneſis [or generation] and Analyſis [or reſolution] of Tartar cannot in this place be with convenience fully diſcovered to you, becauſe they deſerve much conſideration; but that I may briefly touch upon the Anatomy of it, this body conſiſts of a great deal of Salt (the moſt part of whoſe particles are in a ſtate of fixedneſs, and ſome in a ſtate of fluidity and volatileneſs) much ſulphur, a little ſpirit, with an indifferent quantity of phlegm and earth. In the diſtillation the volatile ſalt aſcending with the ſpirit, makes the liquor ſomewhat ſharp and poignant; which is alſo, by reaſon of the great quantity of fluid ſalt and ſulphur, in ſome ſmall meaſure acid and ſtinks ſo abominably, that it ſcarce gains a good ſmell by any rectification. As to the contents of this Stagma or diſtilled liquor, it doth not much differ from the product of Guiacum, unleſs in this, that the ſpirit is leſs acid, and doth not ſo readily diſſolve Corals, and ſhelly ſubſtances: but there is a vaſt difference between the *caput mortuum* of this and that, for as much as out of the aſhes of Guiacum you can draw, with a Lie, but very little fixed ſalt, and out of the Calx of Tartar a great deal. The reaſon of which is manifeſt from what I have already ſaid. *The reaſon of the Preparation.*

CHAP. III.

Of exceſſive or depraved Sweating, and the Cure for it.

SEeing our life is in a continual flux, therefore as we ought perpetually to make new additions to our bodies, ſo we muſt take away and carry off the old and effete matter. Wherefore, for the conſtant removing of all ſuperfluous or incongruous particles, there are many ways of evacuating and purging; in the performing whereof, notwithſtanding Nature oftentimes knows no meaſure, and either makes a ſtop on this ſide, or goes beyond what is moſt convenient. How thoſe evacuations (that lead from the circumference or outward circuit of the body inwards, and carry things off by a kind of particular Sink or common Shore) are to be moderated, or corrected as often as they offend either in exceſs or defect, I have ſhewn you before. The Rule of Method now requires, that I give you alſo directions how to cure Sweating (which is an evacuation very general and diffuſive, tending from the centre toward the circumference) when it is exceſſive or depraved.

And indeed that ſuch a Diſtemper as this doth oftentimes happen, is very obvious to common obſervation. For nothing is more uſual, than for ſome People that are ſick of a Conſumption or Scurvy, and others that recover at laſt with much ado, out of lingring Fevers; nay, ſome that have no other diſtemper, nor any evident cauſe for it, to be always ſubject to daily, and oftentimes very exceſſive Sweats. Therefore, concerning exceſſive Sweating, let us firſt enquire how many ways, and from what cauſes ſuch an evacuation may ariſe; and then ſhew what remedies, and what methods of Adminiſtration are moſt proper in ſuch caſes. *Exceſſive ſweating is a Diſtemper too frequent.*

As to the firſt of theſe, frequent and immoderate Sweating is ſometimes the ſymptom of ſome other preſent diſeaſe; for in a Conſumption and the Scurvey (as I have already told you) this is familiar: the reaſon of which is, becauſe when the Bloud, being either defiled with ſome impure and infectious matter, or in an ill temper, cannot rightly concoct and aſſimilate the nutritive juice that is perpetually poured into the maſs thereof, it ſeparates the ſame, which is ſtill degenerous, and often gathered to a fulneſs with other recrements thereof, and throws it forth by Sweat. *Sometimes it is the ſymptom of another diſeaſe.*

The cure of this Sweating depends altogether upon the removal of that diſtemper whereof it is the ſymptom; and in the mean time concerning that, as to what belongs to the regulation of our diet, we may take a very uſeful and neceſſary obſervation from this ſymptom; that is to ſay, that when nocturnal and exceſſive Sweats attend that ſort of Diſtempers, you muſt uſe a Diet of very thin Food, to wit, Milk, Water-gruel, Barly-Broth and the like (whoſe gentle and ſoft particles the maſs of bloud may bear) and not by any means of Fleſh or ſtronger meats.

2. Exceſſive Sweating is ſometimes the effect of another Diſtemper that is gone and paſt, as when it ſucceeds lingring Fevers: for it very frequently happens, that burning *1. It is alſo ſometimes the effect of another diſeaſe.*

Phar. Rat. Part I.

burning Fevers end in ſweating evacuations (as when an hot Summer ends in a rainy Autumn) ſo that ſcarce any one recovers from that tedious diſtemper without this indiſpoſition left behind it; which yet in ſome People is moderate and eaſily to be cured, but in others more grievous and no leſs troubleſom than that diſeaſe, of which it was the off-ſpring. I knew a young man, who after having been ſick of a Quartan Ague for ten Moneths, when he grew well again, and began to miſs his Fits, melted each day into ſuch exceſſive ſweats, that he was fain to change his ſhirt and the ſheets which were wet quite through (as if they had been dipped in Water) three times every night. By reaſon of this evacuation, which continued ſo for ſeveral weeks, his fleſh was ſo conſumed, and his ſtrength ſo exhauſted, that he was reduced to the thinneſs of a Skeleton. This perſon, when he had uſed ſeveral remedies without any great benefit, at laſt by drinking of Aſſes Milk night and morning, and uſing for the reſt a Diet of Cows Milk, in a ſhort time recovered.

The reaſon of it. In ſuch caſes as theſe the bloud perpetually rejecting its contents [or that which is in it] and as it were vomiting it out by the mouths of the Arteries, doth not onely immediately caſt forth the chyle that is poured into it out of the Bowels, but likewiſe ſucking back both the nervous juice, and the ſubſtance or parenchyma of the ſolid parts for its own nouriſhment, it preſently nauſeates all that, as well as the nutritive liquor, and expells them through the pores of the skin.

The cauſe of exceſſive Sweating. The chiefeſt cauſe of this Diſtemper ſeems to conſiſt in an ill temper and weakneſs of the bloud; in as much as the liquor of it, like ſower Milk, is continually apt to diſſolve and be precipitated into a ſerous nature; which is the reaſon that not onely its own corruptions, but alſo all other humours that flow into it from other parts, if they cannot be aſſimilated, are preſently ſeparated, and ſeeing the pores of the skin are very wide, are carried off by ſweating, rather than any other way of evacuation. But whereas the bloud is diſpoſed for fluidity or diſſolution ſo much, the reaſon is many times, from the predominancy of the fluid or acid Salt (at in ſower Milk) in the maſs of it. But ſometimes the nervous juice degenerating into a ſharpneſs, is rather and more in the fault; for thereby the acid dreggy parts of it, being remanded or ſent back into the bloud, diſſolve the maſs of it and precipitate it into a ſerous humour: and from ſuch a cauſe I ſuppoſe the *Diabetes* and Engliſh ſweating (as they called it, becauſe it was peculiar to this Nation) had their originals.

Partly from the ill temper of the bloud.

Partly from want of heat in it. Such exceſſive ſweating as this, doth not proceed onely from the vitiation of the temper and fermentation of the bloud, but ſometimes uſes to ariſe from a depraved heat therein. How the bloud, which boyls up in a Fever through exceſs of Sulphur, breaks out now and then into ſweats, I have ſhewn you before: but this ſymptome ſometimes happeneth as much through the defect of Sulphur. For if at any time the Bloud being impoveriſhed and made more watery, is leſs heated, for that reaſon, whenever it is forced into a more rapid motion than ordinary, through external heat or agitation of the body, the ſerous parts of it muſt of neceſſity (if they cannot be conſumed with heat, or exhale inſenſibly) be diſſolved into ſweat. Sulphur is lacking in the bloud, either becauſe it is conſumed, as after lingring Fevers, or becauſe through ſcarcity of nutriment, there is not a ſufficient quantity generated. This latter cauſe you may obſerve not onely in many men (who either having wanted proviſions, or having uſed a Lenten Diet, after hard running or walking, fall preſently into a ſweat) but alſo very ſignally in ſome Beaſts, which when they are fed with freſh Graſs or Hay, ſweat very much, and quickly tire upon any labour.

The Cure of it; which is performed by doing three things. As to the cure of exceſſive ſweating, which ariſes from the aforeſaid cauſes and occaſions, the means to remedy it will be chiefly theſe three; to wit, Firſt to remove or amend the ill temperature or weakneſs of the humours. Secondly, A little to conſtrain or cloſe the pores of the skin which are too wide. And thirdly, To draw the Serum and watery recrements of the bloud toward the Reins.

1. The firſt Indication. To take away the ill temper of the humours. 1. The firſt is performed by ſuch remedies as deſtroy the predominancy of the acid Salt in the bloud or nervous juice; and alſo ſuch as promote the exaltation of the Sulphur if perchance it be deficient. To which ends antiſcorbutical, chalybeate, and all Medicins that are prepared with volatile, nitrous, and alchalized Salt, are oftentimes uſeful; of each whereof I will here add ſome Receipts.

Take of Conſerve of the Flowers of Succory and Fumitary, each ℥ ij. *of Powder of Ivory, of Harts horn, and of prepared Coral, each* ʒ j. *of Pearls* ℈ ß. *of Species Diarrhod. Abbatis* ʒ j. *of Lignum Aloes, yellow and red Sanders, each* ʒ ß. *of Sal Prunellæ* ℈ iv. *with a ſufficient quantity of Syrup of Fumitary: Make a Confection, and let the Patient take*

take the quantity of a Wallnut at Evening and in the Morning early, drinking thereupon either of the following Julap or of distilled water ℥ iij. *Phar. Rat.* Part I.

Take of the Water of Fumitary and plain Wallnuts, each ℥ vj. *of Snails and of Worms, each* ℥ j. *of Sugar* ℥ vj. *mingle them and make a Julap.* *A Julap.*

Take of the Tops of Beech, Tamarisk, and Cypress, each iv. *handfulls, of Myrtle* ij. *handfulls, of the Leaves of Watercresses, Brooklime, of Maudlin, of St. Johns wort, Harts Tongue, and Pauls Betony, each* iij. *handfulls, with the outward rinds of* 12. *Oranges, which when you have cut in pieces and bruised, pour to them of Mum* viij. *pints, distilling it in the common Vessels, and mingle the whole liquor, and sweeten it at your pleasure. The Dose is* ℥ iij. *twice a day.* *A distilled water.*

Take of the leaves of Pissabed, Water Cresses, Plantaign, and Brooklime, each iij. *handfulls, bruise them, and pour to them of the distilled Water just now prescribed one pint, strain them hard. The Dose is from* ℥ iij. *to* iv. *in the morning at* 9 *of the Clock, and at* 5 *in the afternoon.* *An Expression or squeezing out of a liquor.*

According to this method in a languidness of the strength, and nocturnal sweats after long Fevers do I use to prescribe; and if these remedies have not a good effect, then I am fain to proceed to Chalybeate or Steel Medicins. *Chalybeates or Steel Medicins.*

Take of Syrup of Steel ℥ vj. *and let the Patient take one spoonful in the morning and at* 5 *of the Clock in the afternoon with* ℥ iij. *of the Water before prescribed.* *A Syrup.*

Take of the Powder of Ivory, and of prepared Coral, each ʒ ij. *of Crocus of Iron, and of Salt of Steel, each* ʒj. ℈. *make a Powder. The Dose is* ʒ℈. *twice a day, with* ℥ iij. *of the same distilled Water.* *A Powder.*

Take of the Tincture of Salt of Tartar ℥ j. *The Dose is from* 20 *to* 30 *drops twice a day with the distilled Water.* *Tinctures.*

After the same manner you may give Tinctures drawn out of Coral, and likewise out of Gums and Balsams. Moreover in these cases Spirit of Hatts horn, of Piss or Soot are oftentimes given with success.

The second intention for the curing of excessive sweats, consists in a due constitution of the pores, and is performed for the most part by exteriour administrations; to which end you must use to anoint the whole body with Oil of Almonds, Palm Oil, Ointment made of Orange Flowers and the like; and wear linnen that is moistned with these things. Sometimes Bathing in cold Water, or in a River, and sometimes change of Air is good. Concerning the use of all which (since they are vulgarly known) I shall not need in this place to prescribe a particular Rule. *The second Intention consists in the alteration of the pores*

But here it seems necessary to say something concerning a certain troublesome Distemper, tending toward excessive Sweating, or at least immoderate Transpiration. I have often observed that some men have had the pores (or instruments of Transpiration) in their bodies so disposed, that they were injured by nothing more, than by the unusual approach of the Air; in so much that though they were well looked, lusty men, had a good appetite, slept well, were strong in their limbs, and seemed every way healthful, yet they could not endure even the least breath of the open air or wind, but they presently felt the greatest disturbance in their spirits, a faintness in all their faculties, and an indisposition in their whole bodies; which kind of disorder, though it be so slightly contracted, they do not either quickly or easily shake off, but recover themselves to their former state onely by length of time; and such as are inclined to this Distemper fear the air more than others do fire or water. Hence some of them dare not venture to go out of doors, whilest others living in a close Chamber, will not suffer either the door or window to be opened, and if perchance a small blast get in through any by-hole, they presently are very sensible of it, and suffer for it. I have known some that upon such an occasion have been kept in their Beds for several Moneths. I remember a Schoolmaster who was an healthy strong man, that for above ten years never went out of his Chamber, nor could be brought to it by any temptation or persuasions: and when after that, the house falling on fire, he was dragged out by force, he was dangerously ill from that time for several Moneths, without any other hurt, or ailment. Others are afraid to walk or stand upon a Court or Pave- *Of that Distemper, which is commonly called An aptness to catch cold.*

Phar. Rat Part. I.

ment laid with Stone, Earth, or Bricks, as being uſed to get great injury thereby. Many other ſuch like caſes as theſe happen, which are attended with this infelicity alſo, that few pity ſuch as are ſo indiſpoſed, and do not think them to be really ſick ſave onely in their fanſie.

The reaſon is inquired into.

That therefore we may a little inquire into the nature of this Diſtemper; I do not think that theſe people complain of nothing at all, but without doubt they do feel a kind of pain or indiſpoſition, which is inflicted upon them either by the cold which they take, or the alteration of their way of tranſpiring: but to know certainly what it is, and wherein the reaſon of it conſiſts, we muſt firſt of all conſider, after what ordinary manner the particles of the ambient [or encompaſſing] air work upon the pores of our bodies, and affect their ſubjects, to wit, the animal Spirits, which are diffuſed about the ſurface of our bodies. For it is manifeſt that the animal Spirits, as being of an ethereal nature or conſtitution, are very much refreſhed by the congenerous particles of air or light (ſo they come proportionably to them) and are moved to a pleaſant kind of expanſion [or breadthening of themſelves.] So likewiſe the bloud, whilſt in its circuit it paſſes through the outward borders of the body, doth there as it doth in the parts about the heart, not onely exhale its fuliginous parts through the mouths of the arteries, but alſo receives a nitrous matter to keep in the flame thereof, through the cavities of the veins. In order to theſe benefits of the bloud and animal ſpirits, the pores of the skin ought to be rightly faſhioned, and opened in ſuch manner, as that the particles of air and light, being a little rarified, may ſtrike againſt the outmoſt ſurface of both thoſe ſubſtances in a moderate quantity and with a gentle fall. For otherwiſe, if the approach of the agent to the one or other of thoſe patients, or to both of them together, be diſproportionate, immediately diſturbances ariſe in this or that, or in both parts of the ſoul together. For if the ſpirits that are outward, are either weak, infirm, and ſoon ſcattered in themſelves, or expoſed to the open and ſharp air, by reaſon that the pores are too wide, it often happens that they are put into flights and diſtractions upon every ſlight occaſion; in ſo much that the party hath pains, convulſions, or weakneſs, not onely in ſeveral places about the outward parts of his body; but oftentimes taking cold (as they call it) is attended with a faintineſs of the whole ſoul, which is not ſoon nor eaſily relieved. And indeed hence it is, that the aforeſaid diſorders in Tranſpiration do chiefly ariſe, in as much as the ſenſitive Soul, being not either ſtrong enough, or not well guarded, is too much expoſed to the injuries of the external air; and conſequently upon the briſker appulſe thereof, is diſturbed either in this or that part, or in its whole ſubſtance at once, and forced into diſorders which are not eaſily allayed. Moreover hence alſo it is, that the flamy part of the ſoul is uſually affected and diſturbed by conſent no leſs than in it ſelf, through the diſproportionate acceſſion of the Air. For the nervous fibres and branches being contracted into wrinklings and convulſions, do variouſly bind the bloud veſſels, which are tied about by them, ſo that the bloud is put into inordinate floatings. And beſides that, the maſs of bloud of it ſelf ſuffers very much for the faults of depraved Tranſpiration both in its heat and temperature. In reſpect of the former, the vital flame, which ſhines about the ſurface of the body is uſually forced by any hard or ſharp blaſt upon it to twinkle or tremble and divers inequalities, whereby the whole ſoul is ſhockt. And then it is well known that the mixture of the bloud is not in more danger from any thing than from a vitiated tranſpiration: for from hence proceed thoſe diſſolutions and precipitations of the Serum in the maſs thereof, by which Catarrhs, Coughs, Aſthmatick, Nephritick, and Athritick Fits are cauſed.

How the Bloud and Spirits are affected by the ambient Air.

The aforeſaid Symptoms proceed from their being affected.

From what I have ſaid it will be eaſie to ſhew you the true nature, with the cauſes and cure of the Diſtemper, which we now treat of. For when any one contracts a pain or a numneſs, or a palſie on the ſudden in any member, through the approach of cold or the open Air, the reaſon of it is, becauſe the animal ſpirits that abound in the membranous fibres, being ſmitten and put to flight, are driven into diſtractions; and if, beſides that, there happen upon ſuch an occaſion a languiſhment in the whole body, and a weakneſs in the parts, not onely one party of the ſpirits, but the whole ſubſtance, or the ſenſitive ſoul in general, ſeems to ſuffer for it. Which being ſmitten and thereby contracted and ſhortned into a leſſer compaſs, ſinks within the organs of the body, and ſuffers the faculties thereof to grow lank or ſlack. But, more then all this, if any one that is careleſly expoſed to the Air, happens in a ſhort time to have a ſwelling, Inflammation, Tooth-ach, Catarrh, Cough, or Pleuriſie, or if a Chilneſs comes upon him, attended preſently with a Feveriſh heat or burning, it is a ſign that the bloud no leſs than the animal ſpirits is affected by the diſproportionate appulſe of the Air, and conſequently that the liquor thereof being either diſturbed in its motion or heating, is diſpoſed toward feveriſh ebullitions, or being diſſolved in its mixture, is forced to va-

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rious fasions and precipitations of the ſerous liquor. It would be in this place a vaſt and a painful work to deſcribe all thoſe diſtempers, which ſometimes owe their original to ſuch a cauſe. Hence oftentimes comes the Headach, ſwimming in the brain, Drowzineſs, Catarrhs, Inflammation in the Eyes, the Quinzy, Blear-eyedneſs, the Cough, Vomiting, Looſneſs, and a thouſand other Maladies, in ſo much that the Vulgar uſe to reduce the evident cauſes of almoſt all Diſeaſes to theſe two heads, to wit, Hard drinking over night, and catching cold. *Phar. Rat.* Part I.

I have hitherto deſcribed the formal reaſon, and conjunct cauſes of Perſpiration; but as to the procatarctical or prediſpoſing cauſe of it, by reaſon whereof ſome are more apt to catch cold than other ſome, I affirm, that this conſiſts either in the vitiation of the animal ſpirits, or of the Bloud, or Pores, that is to ſay, of one or more of them together. *The Original of this Diſeaſe conſiſts,*

1. The animal ſpirits are ſometimes in fault, becauſe being very weak, they cannot endure any hard or rough thing that is outwardly applied to them, but are immediately upon the appulſe of the open air, put into flights and diſtractions; as many People after long ſickneſs are afraid to ſtay in the air, and as ſoon as they go out of doors, many times fall into relapſes. Moreover the Spirits ſometimes incline to that diſorder in Sweating, in as much as being degenerated, and having gained a ſharp and reſtleſs nature, they are put into diſorders upon every approach of the air. Wherefore thoſe who grow hypochondriacal by reaſon of their ſpirits being ſo diſpoſed, are likewiſe obnoxious to the diſtemper which I have deſcribed, and are diſturbed with cold upon every ſlight occaſion. *Partly in the Spirits;*

2. The Bloud diſpoſes us to the habit of a depraved Tranſpiration upon a double account; to wit, both in reſpect of its temperament, and the mixture of it. As to the latter, the conſtitution of the bloud is oftentimes ſo looſe and diſſolute, that it is altered upon every little occaſion (and eſpecially by the appulſe of the cold or humid air) into fluxions and precipitations of the Serum; in ſo much that thoſe who have ſuch bloud, dare not by any means to go abroad, or ſcarce ſo much as even to look out at their Windows. But the maſs of Bloud being often hot and very vaporous in its temperament, exhales ſuch particles as are exceſſive ſharp and penetrating; by which whileſt the Pores of the skin are too much opened and made wider, not onely the ſpirits, but the vital flame are expoſed, more than they ought to be, to the injuries of the open air and the wind. *Partly in the Bloud.*

Thirdly, An ill conſtitution of the Pores, proceeding either from ſickneſs or otherwiſe, or which is natural and inbred, inclines very much to this habit of depraved ſweating. For if thoſe paſſages are too wide, and almoſt always gaping, the bloud and ſpirits are not ſufficiently guarded in the whole or certain parts, againſt the appulſe of the external air. Such a wideneſs of the Pores is in ſome men inbred and natural, as in thoſe that have a ſoft and looſe skin; their skin is commonly thin and very porous. It alſo is uſually contracted by ſeveral ſorts of accidents: as, after a ſweating Diet continued for a long time, and likewiſe after frequent ſweats, that uſe to break forth about the declinations of Fevers, the Pores of the skin being a long time extended and widened, gape a good while after, and continue more open almoſt always. *3. An ill conſtitution of the Pores.*

This Malady, though it do not threaten death, yet becauſe it renders a mans life very uneaſie, or altogether uſeleſs, it very well deſerves a Cure; in order whereunto three things are moſt chiefly to be taken care of; to wit, firſt, that the weakneſs or dejections, or depauperations of the ſpirits and the bloud be remedied. Secondly, The ill temper of them both (if any ſuch thing there is) be removed. Thirdly, That you cauſe a due conformation of the Pores. *The Cure of it,*

1. The main matter in this affair, is to look after the firſt intention, as far as that concerns the corroboration of the animal ſpirits, or the enlarging of the whole ſenſitive ſoul: for unleſs you can perſuade the Patients to take courage ſo far as to attempt going out of doors, exerciſing their utmoſt ſtrength, and accuſtoming their nature to aſpire unto things that are more difficult every day than other, all Medicins are in vain; upon which account they will want good Diet and cheerful company, as much as Phyſick; that the quantity of animal ſpirits may be daily renewed and augmented, and more than that, receive new ſtrength from repeated and greater attempts: to which ends generous Wines, and delicate Victuals, in moderate quantity, are very conducive. And again, They muſt lay aſide all ſtudy and care (whereby the ſoul is depreſſed) and ſpend their time in ſport and recreations, or moderate exerciſes. By ſuch a kind of life as this, rightly mannaged, as the animal ſpirits are very much refreſhed, ſo the decays and impoveriſhments of the Bloud, are reſtored. *1. The firſt Intention is the corroborating of the ſpirits.*

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For the ſame ends alſo the following Medicins may be given with good ſucceſs.

A Spirit.

Take of Succinum Ammoniacum, a convenient quantity, and let the Patient take from XV. *to* XX. *drops, at night and early in the morning, in a ſpoonful of the following diſtilled Water, drinking upon it* IX. *ſpoonfuls of the ſame.*

A Diſtilled Water.

Take of the Leaves of Sage, Roſemary, Time, Savory, Marjoram, and Coaſtmarry, each IV. *handfuls, of the Roots of Angelica and Maſterwort, each* ℥ VJ. *of Zedoary, the leſſer Galingal, Sweet Cane and Orice, each* ℥ j. ß. *of Cubebs* ℥ j. ß. *of Nutmegs, Cloves, and Cinnamon, each* ℥ j. *the outward rind of* XIJ. *Oranges and* VJ. *Limons, cut them, bruiſe them, and pour to them of White Wine and Canary, each* IV. *pints. Diſtil them in the common Inſtruments: mingle all the liquor and ſweeten it with Sugar of Pearl. In the diſtilling of it hang in the top of the Limbeck a little bag of* ℈ j. *of Amber griſe, and* ℈ ß. *of Musk.*

A Tincture.

Take of the Tincture of Antimony or Balſam of Tolu ℥ j. *and let the Patient take from* XV. *to* XX. *drops in the morning at nine of the Clock, and five in the afternoon, in a ſpoonful of the Water preſcribed, drinking thereupon* ℥ IIJ. *of the ſame, or rather in the morning let him drink upon it a draught of Tea, or Coffee, or Chocolate made with the Decoction of Sage.*

A little before Dinner let him take a draught of Sherry.

When you have uſed theſe Medicins for ſome time, and have a mind to leave them off, take theſe that follow in their ſtead.

In the room of the Spirit take a Doſe of the following Electuary every night and morning, with the deſtilled Water, or Viper Wine.

An Electuary.

Take of the rind of Citron wet preſerved ℥ j. ß. *of Myrabolans preſerved* ℥ j. *of Nutmeg and preſerved Ginger, each* ℥ ß. *of the Confection of Jacinth and Alchermes, each* ℥ IIJ. *of Pearl prepared, and of red Coral prepared, each* ℥ j. ß. *with Syrup of the juice of Chermes: and make an Electuary.*

Phyſick Ale.

For your ordinary Drink take Phyſick Ale, prepared in manner following; that is to ſay, into a Veſſel of IV. Gallons put the following Bag:

Take an old Cock half boyled and cut into ſmall pieces, and of the Leaves of Sage and Harts tongue dried, each ij. *handfuls, Dates ſhredded in number* VJ. *of the ſhavings of Saſſafras* ℥ ij. *ſhred them and bruiſe them, and then mix them, and make a Bag, to be put in after the Ale hath done working.*

2. *The ſecond Intention.*

2. The ſecond intention, that undertakes to mend the ill temper or depraved nature of the ſpirits and the bloud, is performed by the ſame remedies, which are proper in the hypochondriacal and melancholy Diſtemper; wherefore from the Cure of thoſe Diſeaſes, which I have formerly ſet forth, the Forms of their Preſcriptions may be made uſe of in this place.

3. *The third Intention, which is, the alteration of the Pores.*

3. As to the third Intention, which inſtructs us in the due Method of uſing Cloths, Air, Fire, and Food, far the regulation of the Pores, it doth not much concern a Phyſician. For the Parties affected, meaſuring themſelves and their ſtrength according to their own imagination, put on ſuch Cloths, keep themſelves cloſe up in their Chambers, lie in Bed, and ſit by the Fire, even as long or as much as they pleaſe, never hearking to the adviſe either of Friends or Doctors. Whatever other People tell them concerning thoſe things, they for the moſt part reject in confidence of their own experience, and the good or hurt which they have found. The onely counſel that they moſt commonly uſe to take, and is moſt helpful, is this, that they ought to change the Air and the Soil where they live, which oftentimes alters their minds alſo. For let them be never ſo impriſoned in their Houſes or cloſe Chambers, yet when they go into foreign Countries, where they breath in hotter and more ſerene Air, it is hardly credible how ſoon they recover. So much of depraved or perverted Tranſpiration; the Theory of which Diſtemper, I therefore delivered the more fully, becauſe it is left untouched by others: Now let us return thither, from whence we digreſſed, and treat of exceſſive Sweating.

There

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There remains ſtill another ſort of this Diſtemper, called immoderate Sweating, which is, not as the former, an effect or ſymptom of any preſent or paſt Diſeaſe; but is at the very firſt beginning either a Diſeaſe by it ſelf, or the Parent of ſome morbid Diſtemper. To the former of which belongs chiefly that peſtilent Sweating, which was heretofore amongſt our Countrymen, and therefore through the whole World called by the name of *The Engliſh Sweat*; into the cauſe of which we will by and by inquire. But to ſay nothing here of the bloud, black, or blue fœtid, or ſweet Sweat, (of which good Authors make mention, and of ſome whereof we have now and then made obſervation) I have often taken notice, that ſome People have fallen into an habit of ſweating, without any manifeſt cauſe; and then that the evacuation being daily augmented, hath increaſed many times to great exceſs; in ſo much, that the moiſture (of the whole Body ſeemed to be poured forth into Sweat. And indeed it is no wonder that this Diſtemper, when it is once begun, ſhould daily augment; for thoſe that ſweat much or often, are very thirſty, and conſequently drink to exceſs, and ſo the more they drink the more they ſweat: by which means theſe two do mutually take the turns of the Cauſe and the Effect, and by a long ſeries produce one another. There lives yet in this Kingdom a noble Lady, famous for her extraordinary, or rather ſtupendous ſweating theſe many years laſt paſt, who every night doth not onely wet, or rather deluge her Linen and all the cloths about the Bed, but likewiſe puts a Baſin under her thighs, into which ſeveral ounces, nay according to the vulgar relation, ſeveral pounds of meer Sweat drop from her; and in the mean time ſhe is forced by her continual urgent thirſt, to drink more than ordinary, whereby as her ſtrength is reſtored, ſo her ſweating is prolonged. I had the ſtory of this ſtrange indiſpoſition, not onely from other perſons of good credit, but from the Ladies own mouth, though I never was conſulted in order to the recovery of her health. But ſhe took ſeveral remedies from ſeveral Phyſicians, tried many methods concerning Diet, and the regulation of the Six Non-naturals, drank Waters of almoſt every kind, and tried the Air of foreign Countries, eſpecially of *France*; but notwithſtanding all this, the Noble Lady is ſtill troubled with this extraordinary dropping. Now ſeeing I have yet known nothing of what happened about the beginning, progreſs, and alteration of this Diſtemper, or what was obſervable concerning thoſe things that gave her eaſe or pain, and that I had the honour only once to ſee, and talk with her no more than juſt *en paſſant*, it will not be eaſie for me to give you the reaſon of this caſe: but however I may be allowed to gueſs, that in this, as in other inſtances of Nature, the *Serum* of the Bloud being apt to ſeparate too eaſily, left the ordinary paſſages of evacuation through the reins, lymphæducts, and other ways, and having firſt occaſionally begun to go this way through the pores of the skin, and afterward facilitated its motion by a kind of habit, affected, and conſtantly obſerved the ſame; to which perhaps we may add, that the predominancy of the fluid Salt in the bloud and nervous juice, cauſeth a continual fuſion of the Bloud, and a plentiful ſeparation of the *Serum*. To cure this Diſtemper, now ſince it is confirmed by a long habit, and that the œconomy of Nature alſo is quite inverted by it, I cannot tell whether any Medicins or Method of Phyſick would do any good upon her. For my part, I did not think fit to propoſe any to her, when I had formerly the opportunity to ſpeak with her. If that great Remedy for a vitiated Tranſpiration, to wit, Change of Air, be repeated, I would have her go no more to *France*, but *Denmark* or *Swedeland*.

The third ſort of ſweating, which is a Diſeaſe of it ſelf.

A notable Story of it.

The reaſon of it.

It would be pertinent in this place to treat a little concerning *the Engliſh Sweat*, which was formerly ſo rife, not onely among our Countrymen at home, but alſo abroad, and that in a very fatal degree. But yet ſeeing this Diſtemper hath not been known within an Age laſt paſt, and we cannot know the nature of it but by the Writings of others, I muſt not contrive any Hypotheſis concerning the nature and cauſes thereof, but onely after the Story, which I take of it out of Authors, lay before you my own Conjectures.

Of the Engliſh Sweat.

The *Engliſh Sweat* began in the year 1485. about the beginning of the Month *Auguſt*, and continued to the end of *October*; and though *Sennertus* ſaith that this Malady was from that time 40 years familiar and continually in this Country, yet our Countrymen, both Phyſicians and Hiſtorians, who lived either at that time or near it, obſerved that it had perfect and great intervals: and when it returned only four times in the ſpace of 66 years, to wit, in the year 1506. 1517. 1528. 1551. it raged ſcarce ever above 6 months, and ſometimes was gone in 3 months time, and that there was always a very wet ſeaſon before it came. But every year that it was rife, it deſtroyed a vaſt number of men in all places, in ſo much that when and whereever it reigned, a third part of the People were miſſing in a ſhort time. So great was the malignity thereof, that as ſoon as it invaded any City, it would every day ſeize upon five or ſix hundred perſons, and of

The Story of it.

thoſe

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thoſe that were ſick at firſt, ſcarce the hundredth man eſcaped. I thought good here to inſert that compendious and methodical deſcription of this Diſeaſe which *Sennertus* hath given us, and which is alſo conſonant to that of our own Authors. Thoſe that were ſeized with this Diſtemper, were preſently weakened without any Bubo, Carbuncles, Breaking out, or Languidneſs, and fainted in their Spirits with extreme feebleneſs in their limbs, reſtleſsneſs, heart-burning, head-ach, frequent, quick, and unequal pulſes, with very great palpitation of the heart; but they ſlowed with perpetual and copious Sweating, which was not ended before the Diſtemper was over, which happened within 24 hours. For thoſe that did not provoke Sweat, nor uſe Cordials, and thoſe that endured heat more impatiently and caught cold, they all died ſuddenly within 24 hours. But afterward when the nature of this Diſtemper was known, and that it did People good to provoke Sweat and uſe Cordials to fortifie themſelves, fewer died of it. [*Sen. of Fevers* b.4.ch.15.] Concerning the Cure of it *Polydore Virgil* writes ſomewhat more accurately. After many Experiments and Obſervations made by the ſick, from things that were helpful and hurtful, it came to paſs at laſt, that they found out a preſent remedy for each perſon, which was this. If any man were taken with Sweating in the day time, that he ſhould forthwith go to bed in his cloths; if in the night and in bed, then that he ſhould lie ſtill, and not ſtir out of the place for four and twenty hours together; and that in the mean time he ſhould ſo load himſelf with cloths, as not to provoke the Sweat very ſtrongly, but let it drop gently from him of its own accord; that he ſhould eat nothing, if he could endure to abſtain ſo long; nor drink more of his uſual warmed liquor, than was moderately enough to quench his thirſt. But all the while that he was about this Cure, he ſhould take care not to put ſo much as his hand or his foot out of the Bed to cool or refreſh them, which to do is mortal. Others ſay, that all that ſpace of a night and a day, the Party was totally to abſtain from ſleeping. This Diſtemper, becauſe it uſually ended, after ſo ſhort a time, in life or death, was called by many Phyſicians, *Febris Ephemera*, or a Fever of a days continuance. Thoſe that recovered of this peſtilent ſweating, after they had continued for a time well, fell many of them into it a ſecond, and ſome of them alſo a third time.

The Deſcription of it out of Sennertus.

The Cure of it is deſcribed out of Polydore Virgil.

The reaſon of it inquired into.

From theſe appearances, that we may preſume to give you the reaſon of this dire Diſtemper, in the firſt place we may gueſs, that the formal reaſon, and likewiſe the conjunct cauſe of that peſtilent ſweating conſiſted in this, that the Bloud being infected by meeting with ſome malignant or venomous matter, and conſequently thereupon diſſolved in its temperament, and melted into *Serum*, was immediately put into a ſweat, (as being the univerſal, and alſo the moſt copious way of evacuation) in order to expel that virulent mixture; by which evacuation, if perchance it happened that all the venomous particles were ſtraight carried off, the Diſtemper ended in a ſhort time with health, but otherwiſe very often with death.

But here I muſt in order make inquiry, whether that malignant matter was firſt generated in the Bloud, or whether it flowed into it from other parts? If you ſay the former, you muſt ſuppoſe that the maſs of Bloud, as in the Plague, had contracted a putrefactive quality by the malignant conſtitution of the ſeaſon and the Air; which afterward, either of its own accord, in as much as it was raiſed to a fulneſs, or by contagion, did, as it had been ſet on fire, break forth into a dangerous, and oftentimes corruptive ſwelling. But that which makes me not believe it to be ſo in this malignant Sweating, is this above all other things, that no ſigns appeared either before, or after, or in the fit of the Blouds being corruptive or much vitiated. For beſides that this Fever is not very high, nor attended with Spots, Breakings out, Buboes, and other ſigns of the Blouds being venomed or in a great heat, it alſo is over in a night and a day; which ſcarce ever uſes to happen in Diſtempers that are deeply rooted within the maſs of Bloud.

The primary cauſe of it.

Wherefore I am rather inclined to think that the original cauſe of this Diſtemper, being firſt founded in the nervous liquor, is from thence communicated to the bloud, whileſt the tragedy of this malignant ſweating is tranſacted. For I ſuppoſe that the aforeſaid liquor, which moiſteneth all the fibres in the whole Body, and is the vehicle of the animal ſpirits in all parts, is degenerated, through the unſeaſonableneſs of the year, from its due craſis, that is to ſay, from its ſpirituo-ſaline volatile nature, toward a ſower, or other more vitiated, and at laſt, malignant quality; and when it comes to that ſtate of depravation, that either of its own accord, through fulneſs, or being ſtirred up by the ferment of the contagion, it begins to ſwell, or diſſolve, being forced out of thoſe irritated parts, and flowing into the maſs of Bloud, it preſently poiſons it throughout, relaxeth the conſtitution of it, and puts it into a moſt exceſſive heat, or boyling, in order to expel and throw that off. Hence plenteous Sweats (becauſe this

In the nervous liquor.

this is not onely the nigheſt but the largeſt way of evacuation) break forth; by which extreme endeavour of Nature, if perchance it ſo happen that all the poiſon is remanded out of the bloud into the habit of the Body, and that thence it be quite caſt out by an univerſal and ſometime continued Sweat, health in a ſhort time appears, like Sun-ſhine after Clouds are totally diſperſed; but if the venomous particles are not ſuddenly nor altogether routed by that fermentation and endeavour to ſeparate them, into which the Bloud is put, in order to expel the malignant matter, the maſs of Bloud becomes, not onely by being deprived of its *Serum*, but vitiated, and overpowered in its Nature, unable any longer to prolong, or keep in the vital flame. *Phar: Rat.* Part I.

From hence it will be no hard matter to aſſign what are the cauſes of its Symptoms, and the reaſons of the empirical or quack Cure thereof. For whereas when the Diſeaſe was upon them, or about the firſt approach of it, before the Fever ſeemed to be kindled, immediately an unuſual languiſhing, a faintneſs of the ſpirits, a great weakneſs in the limbs, an headach, palpitation of the heart with frequent, quick, and unequal pulſes, and other indiſpoſitions in the nerves did afflict the perſons that were ſick of it, it was a ſign that the nervous parts were affected or put out of order before the bloud, and that from them the malady derived its original. *The reaſons of the ſymptoms.*

2. Whereas plentiful Sweat (which was not onely ſymptomatical, but ſometimes alſo critical) ariſes about the beginning of this Fever, quite contrary to what it doth in moſt others, the reaſon is, becauſe the morbifick liquor which flowes out of the nervous fibres and other parts into the maſs of bloud, is thence immediately thrown back upon its very firſt arrival, nor is it permitted to ſtay any conſiderable time in the bloud, or to be intimately mingled therewith. For when a man is not very well, the nervous liquor ſcarce ever agrees with the bloud; wherefore if at any time that flows into this, it is preſently forced out again, and being, before it is infected with the leviſh tincture, ſent away through the reins, it cauſeth a flux of clear Urin; which I have often obſerved to happen in convulſive Diſtempers. But if the nervous liquor being degenerated or depraved, flows back continually into the Bloud, it produces ſometimes an unbloudy Flux or Dyſentery (ſuch as I before deſcribed) and ſometimes a Diabetes, as I ſhewed you in the foregoing Diſcourſe. But I have formerly evinced that cancrous ſtrumous, ſchirrhous, and other ill tumours do ariſe by reaſon of the leſſer and more private ſetlings or ſtagnations of the ſame humour. Now in the Diſtemper, of which we at preſent treat, that nervous liquor, if it be very malignant and peſtilent, it poiſons the Bloud at the firſt touch, and diſſolveth it into a *Serum* which muſt be immediately carried off by Sweat; for otherwiſe if it be ſuffered to ſtay ſome hours in the maſs of Bloud, to circulate, and be intimately commixt with it, it totally corrupts, and plainly mortifies the ſame: hence in that method of curing it, found out by frequent experiments, they take ſuch diligent care, that upon the firſt approach of the Diſtemper, the Parties that are troubled with it are the ſame moment (without ſtaying to pluck off their cloths, or to go into bed) covered all over with the Bed-cloths and compoſed to ſweat, continuing thereupon an equal ſweat through their whole Body, for 24 hours; in ſo much that in the mean time they are not ſuffered to ſtir hand nor foot, or to take either meat, or ſleep; that is, they do nothing at all, to make that peſtilent liquor mix either in greater quantity or more intimately with the Bloud, or to hinder the ſudden and total excluſion thereof. Now if ſuch ſudden, plenteous and equal ſweating cauſed by the inſtinct of Nature and regulated by Phyſick, be continued ſo long, that all the venom exhales through the pores of the skin, the Patients perfectly recover without breakings out in the skin, a lingring Fever, long weakneſs, nightly ſweats, and other conſequences of vitiated Blood. But in as much as the nervous liquor, after its corruptions are ſo purged forth, is apt again in the ſame manner to be depraved, and after that, being diſturbed through fulneſs or contagion, to flow back out of the nervous parts into the Bloud, and to envenom that likewiſe, it therefore happened, that ſome men after they were perfectly well, were ſeized by the ſame Diſtemper a ſecond, yea ſometimes a third time. It will not be neceſſary here to ſubjoin any forms of Preſcriptions in this caſe, becauſe the whole buſineſs of the Cure depends for the moſt part upon a right ordering of the Patient. Beſides it would be very abſurd to preſcribe a remedy or a method to cure a Diſeaſe that is ſo unuſual among us, and which we hope will never return again; or if perchance it doth hereafter come upon us again, it is uncertain, whether we ought to obſerve the ſame rules in curing of it. *An unbloudy Dyſentery and a Diabetes proceed from the ſame cauſe as this Diſeaſe does.*

SECT.

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SECT. VI.

CHAP. I.

Of Cordials and Antidotes.

Cordials and Antidotes have been always of the most common use.

IN the ancient way of Practice among Physicians, and even to this day, according to the vulgar and empirical Method, which Women and Quacks take, the Medicins called Cordials and Antidotes have been almost of the most common use and greatest esteem. The Simples of them are very numerous, their Compositions add bulk to all the Dispensatories both Ancient and Modern, and fill almost every page: But as to the reasons of their effects and manner of operation, to wit, upon what kind of particles their virtue depends, and how they exert their power upon the heart or bloud, or spirits, or other humours; upon this subject, I say, I find nothing said any where, either by Physicians or Philosophers, that may satisfie a mind desirous to know the truth. For the explication of the virtues of Cordials, they do not insist, as in other parts of practical Physick, upon their manifest and sensible qualities, but have recourse to occult and specifick actions, yea to those of the whole substance: When in the mean time, if you consider the thing aright, and dive into the genuine and true reason of it, it will be very evident, that the very notion of Cordial remedy goes altogether upon false ground, and is a Vulgar Errour.

Their common Attributes.

Such Remedies are called Cordials, as by any means relieve the Heart [which in Latine is *Cor*] when it is out of order; wherefore they are said, by many Authors, one extraordinarily to comfort the heart, another to preserve the heart from all putrefaction, and others also to support the heart when it is weak or oppressed, to heal the trembling or faintness thereof, and to keep it from corruption. Moreover because in the Plague, the small Pox, and malignant Fevers, the heart is supposed to be seized or beset with poison or malignity, the remedies therefore that are usually good in those Distempers, are not onely called Cordials, but Antidotes also.

Whence Remedies that preserve Life are called Cordials.

This opinion concerning both Cordials and Antidotes, seems to have sprung from that ancient supposition, which even to this day obtains among the Vulgar, to wit, that the heart is the fountain of all life and heat, and consequently that our health or death depends upon the immediate well or ill being thereof: and hence it is that whatsoever refreshes the soul, and makes us vivid and chearful, are believed to do so by being benign and kind to the heart; and on the contrary, other things are thought to cause sadness and melancholy, so far as they are enemies and disagreable to it.

But indeed, seeing I have elsewhere shewn at large, that the subject of Life is not the heart by any means, but chiefly, and almost only the Bloud, and that the very Soul it self (upon whose existence and action in the Body the Life depends) is founded partly in the Bloud, and partly in the animal Spirits, it will easily follow, that the Remedies which preserve the Life entire, or restore it when decaying, respect these parts of the Soul, to wit, the Bloud and animal Spirits, rather and more immediately than the Heart. For this is not so noble and principal an Entral as it is commonly said to be; but a meer muscle, consisting onely of Flesh and Tendons, as the rest do, and serving for the driving of the Bloud about: but as often as it is defective, or fails in the right performance of this duty, this doth not happen properly through its own fault, but the irregularity either of the Bloud or animal Spirits whereby it is actuated.

They do not act properly upon the Heart;

But upon the Bloud and animal Spirits.

Wherefore that the reasons and manner of operation of those Medicins, which are called Cordials, may appear to us, we must consider these two things; to wit, First how many, and what ways most chiefly, the Bloud, when it is disordered either in its heat, or mixture, and oftentimes in great danger, requires medicinal supplies to preserve or mend its constitution. Secondly, How either through defect or errour in the vital functions the Heart is hindered, or perverted from its due motion, and therefore such Medicins are proper, as may augment the quantity of Spirits, and put them into a better temper.

How upon the Bloud.

As to the first, The Bloud, in respect of its heat, is either deficient or excessive; and in both cases different sorts of Medicins, to wit, hot or cold ones, (which are like Oil or Water) are required; and therefore they are commonly called Cordials,

dials, though they do not at all affect the Heart. For though, after taking of them, the motion of the Heart is oftentimes altered, and therefore the Pulse immediately grows more swift or slow, more strong or weak; yet this is because the motion of the Heart, depending altogether upon the influx of the animal spirits (by a wonderful consent and sympathy between both parts of the Soul) is exactly proportioned to the heat of the Bloud: wherefore as the Bloud increases or remits its effervescence or boyling, by Medicins taken in, immediately the animal Spirits that agitate the Heart, submitting very readily to the condition of it, make the Heart beat faster or slower; and then if the train of animal spirits be affected by the same Medicin, the Pulse thereby is made more or less strong or vehement; when in the mean time the virtue of that Medicin comes to the heart it self, no more than to the hands or feet, or any other muscle. Wherefore that we may rightly settle the first rank of Cordials, whereby the enormities or irregularities of the Bloud are healed, we must consider how many, and which ways the liquor of it, both as to its heat and temperature, is usually perverted or depraved, and after that, what kind of Remedies, commonly accounted Cordials, are requisit for the several Distempers thereof. *Phar. Rat. Part I.*

The Bloud is faulty in its heat and temperature.

First therefore, the Bloud sometimes is not hot enough, nor doth it circulate vigorously, as you may observe in many languishing People; that is to say, such as have been long sick, or suffered any great loss of Bloud, or other immoderate evacuations, or are worn out with age, whose Pulse is weak, their limbs infirm, and their extreme parts cold and pale: the reason of all which is, because the Bloud, when the sulphureous particles are too much consumed, and depressed, is become almost vapid and spiritless; and consequently it is heated in the Lungs very sparingly and weakly; to which oftentimes as an addition, it happens that the vital functions growing weak, the heart which wants a more full influence of the animal spirits, doth not sufficiently exagitate the Bloud so as to put it into a more vegete effervescence or brisk heat.

1. How it becomes less hot than it should be.

What Remedies are proper.

The Remedies that are to be used in this case, are generous Wines, hot Waters, or gentler liquors distilled with Spices, Powders, Species, and Aromatical Confections; Oils and Spirits chymically prepared; Tinctures, Elixirs, and other things impregnated with sulphureous and spirituous particles, such as may put the Bloud into a greater motion, and render it more inflamable and turgid or swelling: and seeing the same things do at the same time exsuscitate or rouze and comfort the animal spirits, they therefore make the heart beat more vegete and strongly. The Receipts of these shall be added in the end of this Chapter.

2. And what also when it is too hot.

Secondly, Oftentimes the Bloud, by reason that the sulphureous particles of it are too loose, and put into an effervescence, is kindled more than it should be, and scattereth an extraordinary and very offensive heat over the whole Body: wherefore to the end, that being so very much rarefied and inflamed, it may be kept within its vessels, and at the same time cooled, the heart beating vehemently and swiftly, drives about the bloud with great labour and pains: and therefore in this case Cordials which are cold and attemperative (to reduce and allay the fervour of the Bloud, and at the same time gently to refresh the animal spirits, that they may perform the task of life which is now more difficult) are most proper; to which ends Distilled Waters of Burrage, Balm, Cowslip-flowers, Marigolds, the rind of a whole Citron, and likewise Syrups and Conserves made of the Flowers and Leaves of such vegetables, the juice of Sorrel, a Citron, Oranges, Chrystal Mineral, and the like, use to be looked upon as good for it; to which Opiates oftentimes are added with success; for when the violence of the hearts motion is somewhat rebated, the bloud more easily and the sooner remits its effervescence or boyling heat.

2. The Bloud being vitiated in its temper or mixture requires Cordials only in Fevers, and then,

These are the more simple Cordials, which are designed onely for one intention, to wit, the increasing or diminishing of the blouds heat. But besides this, the bloud uses also to be depraved, and divers ways perverted not onely in its heat, but also in its temper or mixture: Though Cordials are not presently requisit upon every disorder of it, but onely in those which being caused by Fevers, and also very sudden and violent, threaten the corruption of the whole mass of bloud.

It is either too strict and close in its constitution,

1. The Bloud, when it boils up in a feverish indisposition, is in danger, as to its temper these two ways: that is to say, either the bond of mixture is too strict, and consequently all the particles are so complicated among themselves, and mutually fastened, that the nourishment cannot by any means be disintangled, or separated from the excrement, and the thin part from the thick; as it happens in some continued and putrid Fevers; which though they are little or not at all malignant, yet because they can have no judgment made upon them by Sweat or Transpiration, they sometimes end in death. Wherefore in this case you must use such Cordials as loosen and open the Constitu-

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tion of the Bloud, so that the serous liquor with the other recrements, may separate and be carried off from the body of the rest.

Or too loose.

2. The temper of the Bloud is in danger also another, and that a quite contrary way, to be subverted in Fevers, and consequently Cordial Remedies of another nature, to wit, Antidotes [or Medicins given against corruption, or venom] are most proper. For it often happens that the constitution thereof is too much loosened, and divided as to its temperature, by heterogeneous or foreign particles, which are either generated within it self, or flow into it from other parts, in so much that when the common bond of mixture is dissolved, it all disunites into several parcels; and then the portions of coagulated, or extravasated, and stagnant Bloud which are setled here and there, putrifie and are corrupted; and at length the whole mass of Bloud is so far vitiated, that it is no longer fit to keep in the vital flame, or to convey the animal spirits gently into the Brain: whereupon at that time all the vital functions must of necessity decay, and at last life it self be extinguished.

What remedies this latter fault requires.

In this case the Cordials, which are most requisit, must consist of such particles, as being transmitted into the Bloud, and circulating along with it, may be untameable all the way, but at the same time, benign: upon which account, whilest they get into all the pores and passages of the Bloud, they do in all places disturb the other malignant particles, force them from their combinations, and at last either subdue or drive them out. And when by that means the Bloud being delivered from that venomous mixture, and also freed from all private coagulations, is again divided into small elementary particles, it recovers its former, and in a short time, an healthful mixture.

To wit, Antidotes.

Now that you may the better understand how Antidotes preserve the Bloud and other juices of our Bodies from pestilent Infections, and recover them from corruption when they are already touched therewith; you must consider how other liquors that are subject to putrefaction, may be long preserved, or being seized by it, may be again restored. To which end you may observe of Ale, that though in its own nature it be apt quickly to grow sower, yet by boyling of Hops in it, you may make it keep a great while: yea, that common Water, though it would otherwise putrefie in a short time, yet by boyling or infusing of bitter Vegetables in it (such as Antidotes also are) it continues for a long time untainted: again, that some juices of herbs, and several other liquors, which are already corrupted, if they are smoaked with burning of sulphur over them, recover their former vigour: so also that Wines, Ale, and other sorts of Drink, which are almost vapid and spiritless, do oftentimes revive again by a fermentation newly put into them. The reason of all which is, because, seeing the corruption of every thing consists in the dissolution of the elementary particles, and their mutual departure from each other, what ever keeps them still in motion and perfect mixture, when they tend toward flight and confusion, keeps that body yet tite and whole. Moreover, whatever forces the Elements when they are dissolved from each other, and would mutually depart, to a fresh union, and stirs them up to a new fermentation, drives away all putrefaction from the body, though it were begun in it, and gives it again a firm constitution. All the Vulgar know that such alterations as these, and such recoveries from corruption are caused with liquors prepared by Art. And indeed Antidotes seem to have the same effect in the Plague as in malignant Diseases. For they being often taken, in as much as they continually stir the Bloud and force it to an higher fermentation (notwithstanding the influence of the noxious corruptive particles) keep the mixture of it entire; yea after the malignity is impressed upon it, and that the temper of the Bloud, in manner aforesaid, begins to be relaxed and dissolved, those kind of Remedies, being given till they promote Sweating, do oftentimes deaden the force or impressions of the pestilential malignity, in as much as they digest the putrefactions of the contagion received, and introduce a fermentation opposite to that other corruptive quality. The sorts and forms of these Antidotal Medicins shall be laid down hereafter.

What Cordials are most proper when the temper of the bloud is too close.

In the mean time, as to those other Cordials, by which the constitution of the Bloud when it boyls up, is relaxed from its extraordinary closeness, and opened to free the feverish matter and other recrements thereof; to give you a more satisfactory account of their virtues and the manner of their operations, we should refer to this head what formerly hath been said concerning the effects of Diureticks and Diaphoreticks. For those Medicins are very nearly related to some Cordials, yea they are sometimes of common and mutual use; in as much as the crasis or mixture of the Bloud, when vitiated, cannot sometimes be relieved, unless you first loosen the temper of it, and make way for the serous liquor to be carried off through the reins or pores of the skin. All these ends of Physick are chiefly obtained by salt Medicins. For, as I have formerly often

often obſerved, the opening of all bodies, whether liquid or ſolid, is for the moſt part performed by a ſaline Key.

How the curdling of Milk and reducing it from that ſtate, or the hindering of it is brought to paſs by the various infuſions of ſalt bodies, and how much reſemblance it bears to the bloud, I have declared by Experiments in the Chapter of Piſſing, or concerning Diuretick Medicins: and as it is in Milk or fluid Bloud, ſo alſo it is with the moſt fixed Metals and other Minerals. For almoſt all concretions or combinations in Bodies proceed from a Salt of one kind, as the diſſolution of them doth from ſome one of another kind, which forces the firſt Salt into its embraces, and then the precipitation is cauſed by a Salt of a different nature, which deſtroys the union of the two former; all which I have ſo clearly and fully explained above, that there is no need in this place to repeat it. Wherefore, that we reckon ſaline Medicins among Cordials as well as Diureticks and Diaphoreticks, the reaſon is the ſame in all: all that I have now to do, is briefly to lay down the chiefeſt ſorts of this kind, that belong to that Head, together with the manner and reaſon of their operations.

They are moſt commonly ſalt ones, and that of different ſorts.

1. Now therefore in the firſt rank, ſuch Cordials as are impregnated with volatile Salt preſent themſelves, and eaſily bear the Bell away from moſt others, as Spirit of Harts horn, Bloud, Sal Armoniack compounded, to wit, with diſtilled Amber, Treacle, Roots of Virginia Creeper, and other Antidotes; as alſo (that which was the onely and univerſal Medicin of a Doctor of Phyſick that turned Quack) the Spirit of Sculls dug out of Graves. Hither alſo we ought to refer the Salt of Vipers, and likewiſe Powder of Toads cloſe calcined (which I formerly, in a peſtilential Fever which was Epidemical at *Oxford*, in the Year 1643. knew to be famous and very good) with many other things. This kind of Remedies have recalled many people from the very jaws of death, and indeed do often afford help upon a different and manifold account; that is to ſay, firſt of all, in that they meet with either a fixed or acid Salt, which they force into their embraces, and thereby open the maſs of Bloud which is too much thickened and bound together by the feveriſh effervescence thereof, in ſo much that they promote the ſeparation and expulſion of the morbifick matter; and then again, in regard that they relieve and comfort the animal ſpirits, and rouze them, when they are ſluggiſh, to the diſcharging of their duty; to which you may add as a third virtue of them, that in malignant Fevers theſe Medicins ſubdue the venomous particles of the morbifick matter, and very frequently deſtroy them.

1. *Cordials impregnated with volatile Salt.*

2. The ſecond place among ſaline Cordials is juſtly due to Remedies that are impregnated with Alchaliſate or petrifying Salt; for theſe are commonly reckoned the moſt famous of that kind. Among which you may count *Lapis Bezoar* or the Bezoar Stone, Pearls, Corals, the Bone in a Stags heart, and horn of the ſame Creature, Powder of Ivory, Eyes and Claws of Crabs, and other Powders both of Stones and Shells, which common experience tells us, are oftentimes given to ſick folks with good ſucceſs, and the reaſon why they are an help in ſuch caſes, ſeems to conſiſt in this, that the particles in the Alchali Salt in the Medicin meet with the particles of acid Salt in our bodies, and forthwith mixing very intimately with them, muſt conſequently deſtroy their violent motions, and all other hurtful combinations. To this Claſs of Cordials are duly referred Bole Armeniack, Terra Sigillata of *Lemnos*, and other Chalky ſubſtances alſo; but yet not for that reaſon, becauſe they ſuccour the heart when it is oppreſſed (as it is commonly believed) but for as much as they deſtroy the predominancies of acid or fixed Salts, either in the Bowels or the maſs of Bloud, and immediately allay or correct the enormities by them produced.

2. *Such as are impregnated with an Alchali, or petrifying Salt.*

3. If I ſhould exclude ſowriſh Medicins, or ſuch as are impregnated with a fluid Salt, from this rank of Cordial Medicins, the Authority of almoſt all Phyſicians, but eſpecially the Ancients, would riſe up againſt me. For theſe are by many Doctors reckoned extraordinary Antidotes againſt the Plague or peſtilential Diſtempers. For the Cure of malignant Fevers, Vinegar of Treacle and of Bezoar are mightily commended; yea they put either Vinegar or ſomething like it, into Waters which they diſtil for that uſe. For the ſame reaſon Spirit of Vitriol, Juice of Citron, of Allelujah, or Wood Sorrel, of Pomegranates, with many other things of the ſame ſort, are reckoned among the number of Cordials; and indeed there is great reaſon they ſhould be ſo, becauſe they are the beſt diſſolvers of fixed Salt and aduſt Sulphur when they combine together and ſubdue their violent qualities, which is the reaſon that in malignant Fevers the coagulations and extravaſations of the bloud that uſe then to happen, are oftentimes prevented or cured by this kind of Remedies.

3. *Such as have in them a fluid or a ſower Salt.*

4. For the ſame or the like reaſons that the aforeſaid Salt Bodies are numbred among Cordials, or Ingredients of ſuch Compoſitions, you may add to that kind of Medicins ſuch alſo as have a fixed Salt for their baſis or foundation. For ſeeing there

4. *Such as have fixed Salt in them.*

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are ſeveral ſorts of Salts generated in our bodies, and that they frequently paſs from one ſtate to another; hence it is, that upon what occaſion ſoever we ought not to give ſalt Medicins of any one, but of ſeveral kinds. How, and by what means ſuch things as are impregnated with a fixed or lixivial Salt, do either deſtroy or correct the enormities of the acid Salt which is in our Bowels or our Bloud, I have ſhewed you before.

5. Such as have a Nitrous Salt in them.

5. The nitrous Salt is very juſtly reckoned among the number of Cordials, as being ſuch a thing, that unleſs the particles thereof are breathed in along with the common air, the life of Animals cannot ſubſiſt: but this taken in at the mouth is looked upon as a famous Antipyreuticon, or Antidote againſt heat, in that it quenches thirſt, and mightily aſſwageth the feveriſh heat; which notwithſtanding it doth, not onely by preſerving the mixture of the Bloud, but alſo by promoting the accenſion or kindling thereof. I have elſewhere ſhewn you, that nitrous particles as well as ſulphureous ones, are requiſit for the production of flame, and that the more plentifully they are adminiſtred ſo much the clearer and brisker it burns. Wherefore when the matter, which for the moſt part conſiſteth of Sulphur mingled with Salt and Earth, is kindled and gives but a glimmering ſhine obſcured with Smoak and Soot, if you put nitre to it, it will immediately grow bright and clear. So I am of opinion it is in Fevers, when the Bloud being filled with aduſt feculencies ſmoaks with a ſuffocating heat rather than burns out, if you take nitrous particles into your mouth and tranſmit them into your Bloud, they will preſently make it burn clearer, and conſequently more kindly; in ſo much that when the conſtitution thereof is more open, not onely the ſerous, but alſo the fuliginous recrements thereof do more freely make their paſſage out. Wherefore my Lord *Bacon* rightly obſerves that the particles of Nitre not onely that are taken into the ſtomach, but ſuch alſo as are breathed in with the common air, do very much conduce not onely to preſerve but to prolong our lives.

Theſe are the chief ſorts of Cordial Medicins, whoſe operation is deſigned moſt peculiarly upon the maſs of Bloud, the conſtitution of which (when it is either too cloſe, and thickened with long concoction) they do ſomewhat diſſolve and open, to make way for the morbifick matter; or they recover the Bloud from putrefaction, when it is diſſolved by any heterogeneous or malignant mixture, and divided into portions that are envenomed, and conſequently obnoxious to corruptive ſtagnations and coagulations; in as much as the particles of thoſe antidotal Cordials, being tranſmitted into the Bloud, and confounded with it in the circulation thereof, (yet ſeeing they are not aſſimilated or ſubdued by it) do ſet upon the venomous particles on every ſide, and either ſubdue them or drive them forth; ſo that the maſs of Bloud being freed from all malignity, and extricated from every kind of coagulation, doth in a ſhort time recover its former temper. Both theſe ſorts of Medicins (in as much as they preſerve the Bloud from corruption or extinction) are commonly called *Cardiaca, i. e.* Cordials, but are more properly named *Vitalia*, Vitals, or the Preſervers of Life.

The aforeſaid Remedies are more properly called Vitals.

How, when they are taken into the ſtomach, they preſently operate upon the Bloud.

But if it be further inquired, how either theſe or thoſe, when taken into the ſtomach, transfer their operations ſo ſuddenly, and almoſt entirely into the Bloud, without any notable action or paſſion cauſed in that ſame part; I ſay firſt of all, that ſuch Medicins do not at all oppoſe, but very well agree with the animal ſpirits; wherefore they do not irritate or provoke the nervous fibres of the ſtomach either to a ſenſe of pain, or any expulſive motion; but they rather excite the ſpirits that are in them to a kind of exultation and complacency, by the propagation of which, the whole ſoul is preſently expanded into a greater breadth. And then again ſecondly, The paſſage out of the ſtomach into the bloud is not, as it was formerly ſuppoſed, ſo long, or extended through ſo many turnings, as that we need fear leſt the virtue of the Medicin ſhould be loſt by the way, but immediately it is tranſmitted from theſe into thoſe quarters. For as I formerly obſerved, there are an innumerable company of bloud veſſels which cover the inner coat of the ſtomach, in ſo much that not onely purging Phyſick, but any other Medicins that are deſigned to work upon the heart, or brain, yea upon the outmoſt part or ſurface of the body, begin their operation upon the bloud, even before they are got out of the ſtomach.

The ſecond ſort of Cordials, that reſpect the animal ſpirits.

So much of Cordials, as they are commonly called, ſo far as they reſtore or reduce the bloud to a better temper, when either in its heat or mixture (the one or both together) it is depraved. Whoſe operation and virtue ſince it affords comfort to the life of man when it is in danger, they may (as I intimated to you) be more properly called Vitals. But beſides this, there are ſome Medicins that go by the name of Cordials, in as much as they firſt and more immediately exert their operations upon the animal Spirits, and thereby raiſe, invigorate and compoſe either ſome portion of the ſenſitive ſoul, and the whole ſubſtance of it, when it is too much contracted, depreſſed,

or

or otherwise put into disorder. And indeed such Remedies as these do in some measure affect even the heart it self, though more remotely. For when by giving of them the whole sensitive Soul is raised, and expanded into a greater breadth, the spirits also which are designed for the heart, flow into it more copiously, and put it into a brisker motion; and consequently the Pulse, which was before but weak and languishing, immediately beats stronger, and the Bloud is driven about with greater force. These kind of Medicins, which are not without some good reason taken for Cordials, do not much differ, as to their matter, from those other Vital Compositions which chiefly respect the Bloud; yea, somethings are common to both kinds. As to the ways of their working, these last may be well enough reduced to two Heads, and in as much as they are either smooth, or rough and harsh, they attain the same end; that is, they either raise and comfort the animal Spirits by soothing, and as it were gently and softly touching or stroaking of them, or by vexing and provoking them as it were with Spurs and Goads, they force them into more rapid, and sometimes more regular motions.

They are of two kinds.

1. Such as are smooth, and gentle to the spirits.

How they work upon the Bowels or Senses.

The Cordials of the first sort, as soon as they are down in the stomach, yea sometimes by then they are got into the mouth, exert their operations, and with a grateful influence refresh and recruit the spirits that inhabit in the first passages, and as it were in the Portico of the Body; and so by the continuity of them, the same exultation is successively propagated into other spirits, and then into others, till in a short time it passes through the whole substance of the sensitive Soul; in so much as not onely the Brain, but the Heart being refreshed with a fuller influx of Spirits that do as it were leap for joy, perform their several functions and offices much more vegete and chearfully. To this end (if you take care not to put the bloud into too violent a motion) the Waters commonly called Cordials, do conduce, being distilled with Wine, or Vinous spirits, and with Spices; as likewise Preparations made with Musk and Ambergrise. So also Aromatick Powders mixed with them. Moreover to this place belong Magisteries and Tinctures of Coral and Pearl, together with Elixirs, and a great many more of the same sort, that have a grateful taste or smell. Hence also all sweet smelling things, and things that are pleasant to the sight, are numbred among Cordials, in that they refresh the animal spirits: for whatsoever kindly affects and delights the spirits that rule in any organ of sense, immediately raise and enlarge the whole Soul. In the mean time other Cordials of this rank seem first to work upon the Brain, without any great disturbance to the spirits that are planted in the entrance of the body, yea without scarce so much as making the first passages and the mass of bloud in any manner sensible of their presence. Of which sort are some of those Medicins that are called Cephalicks, which though they are not so grateful to the palate or stomach, and scarce put the bloud upon a fermentation, or into any violent motion; yet they clear the Brain, and sharpen and corroborate the animal Spirits which are the Inhabitants of it. Of this nature seem to be Sage, Betony, Rosemary, Vervene, and many other things.

Or lastly on the Brain.

2. Or these Cordials are rough and provocative.

Which reduce the spirits to order, by, as it were lashing of them.

2. Some other Medicins and kinds of Administrations (which may very well be reckoned among Cordials) work after a manner very different, and do a man good upon a quite contrary reason; that is, they do not kindly treat the animal spirits, and make them expand themselves equally, but they rather provoke them, and force them to run out extravagantly, and throw themselves to and fro; and that upon this score, to wit, that whereas before they were out of order, and being disperséd unequally, did flow in some places thicker and in others thinner, and consequently intermitted some part of their functions, and especially within the Brain or Heart, or performed them very irregularly, at that time the best remedy is to disturb and put them into a greater commotion by an ungrateful Medicin: for by that means they, (as if they were rouzed up by lashing, or being whipt, forsake their former disorders, and return of their own accord into their regular motions. For so it is usual in Faintings, Swoonings, oppression of the Heart, or Convulsions, yea in almost all other failuers, languishments, or irregularities, to give the Parties concerned either Spirit of Harts horn, Soot, Sal Armoniack, Tincture of Castor, or Asa Fœtida, with other liquors; to hold these things and the like, as especially volatile Salts, and chymical Oils that will burn; and in sudden faintings of the Soul, it may be convenient to sprinkle cold water in the Parties face, to pluck him by the nose, to shake him violently, and sometimes to hit him a cuff on the ear. Such Administrations as these give the Patient ease, in as much as they rouze the animal Spirits when they are oppressed or distracted, or doing ought that is foreign to their proper office, and command them when they are thereby expanded, and as it were set in Battalia to return to their several former duties. But whereas some People think that help proceeds from this, that the Bloud being

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being hindered ſomewhere in its courſe, and eſpecially when it ſtagnates in the heart, begets the aforeſaid maladies, and is by thoſe Remedies and manners of Adminiſtrations reſtored to its proper motion; I ſay, that the cauſe and cure of all thoſe indiſpoſitions, depends but ſecondarily and not immediately upon the Bloud, but that originally not onely the ſtagnation of the bloud proceeds from the hearts animal motions being hindered, but alſo that the impediments of the former, are not to be removed but by the reſtitution of the latter. Having now recounted to you the ſeveral ſorts of Medicins that are commonly taken for Cordials, and the ways and reaſons of their operating upon the Bloud or Spirits, or upon both together, which (I ſuppoſe) I have rightly laid down, I muſt in the next place ſubjoin ſome ſelect Forms or Receipts of them, appropriated to the ſeveral ends of Phyſick aforeſaid.

CHAP. II.

The ſeveral Sorts and Receipts of Cordials.

Such Cordials as increaſe the heat of the bloud.

SInce the Medicins that are commonly taken for Cordials have been diſtinguiſhed into two kinds, to wit, one ſort, that chiefly and more immediately work upon the Bloud, and others that do the ſame upon the animal Spirits; in the firſt rank of them that are deſigned for regulating the heat of the Bloud, I have placed ſuch as force the liquor thereof, when it is too cold, or ſlow in its motion, to run higher, and by increaſing or exalting the ſulphureous particles to a greater quantity and degree, make it burn, as it were, and flame, ſuch as are generous Wines, hot Diſtilled-compound Waters, Spirit and Tincture of Saffron, Elixir Vitæ of Quercetan, Tincture of Salt of Tartar, of Steel, and other things that are filled chiefly with Spirit and Sulphur in great quantity; of which People may take ſometimes one ſort, and ſometimes another, even as the Patient pleaſes. Whenever a languiſhment and fainting of the Spirits, with great oppreſſion of the Heart afflicts a man, by reaſon that the Bloud is too much inflamed, and conſequently is exceſſively crowded, and almoſt ſtagnates in the Heart, in this caſe Aqua Mirabilis, Cinamon, Clove and Wormwood Water compound, and likewiſe ſuch as is diſtilled from Orange Peel with Wine, is very good; to which ſome-

A notable abuſe of theſe Medicins.

times you may add a Doſe of ſome Spirit, Elixir, or Tincture.

But here you muſt uſe great care and caution, leſt you indulge your ſelf too often to theſe kinds of Cordials. For I have known a great many men and women of good faſhion, who by the too frequent uſe of them, have contracted ſuch an ill habit, that they have been forced ſeveral times in a day to drink a ſmall draught or a dram either of generous Wine, ſome Spirits or ſtrong Waters; and then daily to increaſe, and often to repeat the Doſes of the ſame liquors (for Nature having been uſed a little while to extraordinaries, doth not continue long ſatisfied with the ſame quantity) in ſo much that at laſt their ſtomach can endure or digeſt nothing of a moderate nature, but ſtill deſires things that are ſtronger and hotter. But their other entrals, and eſpecially their Liver are ſo dried and roaſted with it, that there is a diminution in their ſtock of Bloud which is depraved in its temper alſo, and a diſtempered ill habit of body, or ſhortneſs of Life hath been the conſequence of it.

Divers and ſundry are the occaſions upon which many People are induced to this ill habit of ſipping Cordial Liquors. For beſides ſudden languiſhments, proceeding perchance from great ſorrow, hard labour, exceſſive ſweatings, or acute pains; if at any time ſuch food as is diſagreable, creates a diſturbance or nauſeouſneſs in the ſtomach, or that through a convulſive indiſpoſition, a man ſeems to be in danger of Swooning, or having his ſenſes taken from him (and for many other reaſons) it is uſual for the Party to drink Vinous Spirits, or *Aqua Vitæ* [*i.e.* Water of Life] though it is improperly ſo called. And then after thoſe ſorts of Cordials having been for ſome time taken, begin to be agreable and delightful, the maſs of Bloud being ſomewhat more largely expanded and put into a greater heat, cauſes the ſubſtance of the whole Soul to be extended and excited into a kind of joy and triumph; which when it ſinks again, the Soul being mindful of that complacency which it received, and not content with its preſent ſtate or condition, longs for the ſame again, and immediately covets once more to take the like pleaſure. Wherefore upon every diſorder of the body or mind, as ſoon as the ſpirits begin a little to faint, forthwith, for the raiſing of them, a draught of Cordial muſt be had, and if it be at hand, is certainly

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swallowed; and so through the frequent and useless spreading or hoisting of the Souls Sails, the Fabrick of the Body, like that of a Ship, is weakened. Nor doth this evil custom prevail upon Gluttons and Drunkards onely, but sometimes Learned men, and very pretty ingenious women, to improve their fansie, and put themselves in a chearful humour, do, by frequent sipping of Spirits and hot Waters, impair and oftentimes totally destroy their own health. I shall not need to add in this place the common and vulgar Receipts of this kind of Cordials; it seems sufficient that I have hinted to you the abuses of them. *Phar. Rat.* Part I.

In the second Class of Cordials I placed such as do somewhat allay the excessive effervescence of the bloud, and do a little restrain and temper the immoderate heat thereof, as Distilled Waters, acid and nitrous Medicins, &c. *2. Such as allay the excessive heat of the Bloud.*

Take of Water of Wood Sorrel, a whole Citron, and Strawberries, each ℥ iv. *of Syrup of the Juice of Citron* ℥ j. *of Pearl pulverized* ʒ j. *make a Julap. The Dose is* ℥ ij. *thrice or four times a day.* *Julaps.*

Take of Water of Sweet Apples, and of Raspberries, each ℥ vj. *of Syrup of Violets* ℥ j. *Spirit of Vitriol* xij. *drops, and make a Julap.*

Take of Spring Water a pint and an half, of Limon juice ℥ ij. *of Sugar* ℥ j. ß. *make a Potion, of which you may take, when you please* ℥ iij.

Take of Graß Roots ℥ iij. *of Candied Ringo* ℥ vj. *two Apples sliced (or of Corins* ℥ ij. *of the shavings of Ivory and Harts horn, each* ʒ ij. *of the Leaves of Wood Sorrel one handful; boyl them in Spring water, three pints to two. To the straining thereof, when it is clarified add of Sal Prunella* ʒ j. ß. *of Syrup of Violets* ℥ j. ß. *make an Apozeme; of which the Dose is* ℥ iij. *or* iv. *thrice a day.* *An Apozeme*

Take of Conserve of Red Roses vitriolated ℥ iv. *of Sprint water* ij. *pints, dissolve it close and hot, and then strain it. The Dose is* ℥ iij. *when you please.*

Take of the Conserve of Barberies, and of the rob of Raspberries, each ℥ j. ß. *of Pearl prepared* ʒ ß. *of the Confection of Jacinth* ʒ j. *of Syrup of Citron juice a convenient quantity. Make a Confection, of which the Dose is* ʒ ß. *thrice a day.* *A Confection.*

The third sort of Cordials affords us such kind of Medicins, as being designed against the disorders of the bloud when it is very hot, do unlock and open the constitution of it when it is strict and close, in order to the separating and carrying off of its recrements or dreggy parts. Now as these are chiefly and almost onely saline, so also, according to the manifold state of those saline particles of which they consist, they are of several sorts; though for the most part the ground or basis of them is either a volatile or alchalized, or acid, fixed or nitrous Salt. Of each of these kinds I will give you some Receipts. *3. Cordials that open the constitution of the Bloud whilest it boyls up and is too close.*

In the first place Cordials that are impregnated with volatile Salt, are usually given not onely in Fevers with respect to the Bloud, but also in fainting Fits and sudden languishings in respect to the animal spirits, and that with success according to the Prescriptions following. *1. Of that sort whose ground is a volatile Salt.*

Take of Spirit of Harts horn xv. *or* xx. *drops, of Treacle water* ʒ ij. *and give it in a spoon, drinking thereupon a small draught of proper liquor.* In the same manner you must give Spirit of Bloud, of Dead mens Skull, Soot, or Spirit of Sal Armoniack compounded. *Spirits.*

Take of Salt of Vipers ʒ j. *of Chrystal Mineral* ʒ ij. *of Powder of Claws compound.* ʒ j. ß. *mingle them and make a Powder, of which the Dose is* ʒ ß. *to* ℈ ij. *in a spoonful of Cordial Julap, drinking upon it a small draught of the same.* *Powders.*

Take of the Flower of Sal Armoniack ℈ ß. *of Bezoar Mineral* ℈ j. *make a Powder and give it in a spoonful of proper liquor.*

Secondly, Those are looked upon by the Vulgar to be the best Cordials that are, whose ground is an Alchalized or a petrifying Salt; as first of all, Eastern Bezoar, Pearl, Coral, and other Powders of Shells and Stones. *2. Those whose ground is an Alchali Salt.*

Take

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Take of Gaſcoign Powder, or of Claws compounded ℈ j. *to* ʒ ß. *and give it in a ſpoonful of Cordial Julap, drinking upon it of the ſame liquor* ʒ ij.

Take of Eaſtern Bezoar gr. vj. *to* xx. *and give it the ſame way.*

Take of the Powder of Claws and Eyes of Crabs, each ʒ j. *of Pearl and Coral, both prepared, each* ℈ iv. *of both ſorts of Bezoar, each* ʒ ß. *of the beſt Bole Armeniack, of Aurum Diaphoreticum, each* ℈ ij. *of Bezoar Mineral* ʒ j. *mingle it and make a Cordial Powder. The Doſe is* ℈ j. *to* ℈ ij. *or* ʒ j. *in a convenient vehicle.*

Which are moſt proper in Pleuriſies.

In Pleuriſies the following preparations are looked upon as the moſt proper Cordials, in as much as by deſtroying the predominancies of the acid Salt they take off, or prevent the coagulations and extravaſations of the Bloud.

Take of the Powder of Boars Tusk ʒ ß. *to* ʒ j. *of Chryſtal Mineral* ℈ j. *of Powder of the Flower of Rhead Poppy* ℈ ß. *make a Powder to be taken in any ſort of Liquor.* In the ſame manner you may give Powder of Crabs Eyes and of the jaw of the Pike Fiſh.

3. *Nitrous Cordials.*

3. To this place belong alſo Preparations of Nitre, which are often given with ſucceſs in Fevers, according to the Receipts following.

Take of Chryſtal Mineral ℈ j. *of the volatile Salt of Harts horn from* gr. iij. *to* vj. *mingle them and make a Powder; which you may give in a ſpoonful of Cordial Julap.*

Take of Chryſtal Mineral, and Antimonium Diaphoreticum, or Sweat-cauſing Antimony each ℈ j. *of Bezoar Powder* ℈ ß. *make a Powder, and give it the ſame way.*

4. *Cordials whoſe ground is an acid Salt.*

4. Medicins whoſe baſis is a fluid or ſoweriſh Sal, is given in Fevers to open or looſen the conſtitution of the Bloud, according to the Forms following.

Take of Spirit of Vitriol drops, from iv. *to* vj. *of Carduus Water* ʒ iij. *of Treacle Water* ʒ ij. *of Syrup of Citron juice* ʒ iij. *of Pearl* ℈ ß. *make a draught, to be taken twice or thrice a day.* After the ſame manner take Spirit of Salt or Nitre. To the ſame end you may take *Cherbet* made of Limons diſſolved in Spring Water, and likewiſe that divine Drink, called *Potus divinus Palmarii.*

Take of the Powder of Harts horn calcined, or Antimony Diaphoretick ʒ iij. *of ſpirit of Vitriol or of Salt* ʒ j. *pound them in a Mortar of Glaſs and dry them. The Doſe is* ℈ j. *to* ʒ ß. *in a ſpoonful of Cordial Julap.*

Such as have fixed Salt in them.

5. The fixed or lixivial Salts of Herbs are oftentimes ingredients in the Compoſitions of Antidotes. And ſo likewiſe Medicins whoſe Baſes or Grounds they are, in as much as they are reckoned great enemies to Fevers, ought alſo to be numbered among Cordials. For example ſake I propoſe to you that common Medicin;

Take of the Salt of Wormwood ℈ j. *of Carduus water* ʒ iij. *of ſpirit of Vitriol or Oil of Sulphur* ℈ j. *of Syrup of Violets* ʒ iij. *make a draught to be taken two or three hours before the Fit.*

Take of the Water of a whole Citron and of Wood Sorrel, each half a pound, of the Salt of Tartar ʒ j. ß. *of Limon juice* ʒ ij. *of Sugar* ʒ ß. *mingle them and make a Julap, which you make uſe of in continued Fevers, that make no remiſſions. The Doſe is* ʒ iij. *twice a day.*

The laſt Claſs of Cordials, and truly in ſome reſpect the chiefeſt, is due to Antidotes, in as much as they are moſt vital. Of theſe there are ſo many ſorts and Receipts abroad in the World, that if I ſhould recount them every one, or but the beſt of them onely, this Work would grow to a vaſt Volume. Of ſuch Medicins as theſe there are many and great Treatiſes extant, and therefore we ought to be ſomewhat more brief upon this ſubject. Since therefore Antidotes are either Preſervatives or Curers, I will give you in the firſt place ſuch ſelect Remedies as are to be uſed whileſt a man is yet in health againſt the contagion of any Peſtilence or Malignity whatever, omitting in the mean while what is uſually preſcribed concerning the Cures and alte-

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teration caused by the ambient or common Air; and then in the second place I will lay before you choice Forms of Prescriptions, which are to be used after the Contagion hath seized you. *Phar. Rat.* Part I.

1. Antidotes for preserving of Health. — 1. *Preservatives.*

Take of the Conserve of the Leaves of Rue ℥ iv. *of Mithridate, and Confectio liberans, each* ℥ j. *of Confection of Jacinth* ʒ ij. *of Salt of Wormwood* ʒ ij. ʃ. *of red Pulvis Pannonicus* ℥ ß. *of Bezoar Vinegar a convenient quantity. Make an Electuary. The Dose is the quantity of a Chesnut thrice a day.* — *An Electuary.*

Take of the Powder of the Roots of Virginy Creeper, of Contrayerva, choice Zedoary and Species Liberans,, each ʒ ij. *of Camphire* ℈ ij. *of Sugar dissolved in Bezoar Vinegar, and made into Tablets* ℥ vj. *according to Art, and make the weight of each Tablet to be* ʒ ʃ. *Let the Patient eat one or two several times in a day.*

Take of the Roots of Virginy Creeper ℥ iij. *and boyl them in three pints of Spring Water till half be consumed; to the straining of which add of the best Honey* ℥ ij. *of Treacle of Andromachus* ℥ j. *dissolve it hot and close and strain it. The Dose is two or three spoonfuls three or four times in a day.* — *An Apozeme.*

Take of the Flower of Brimstone ℥ iv. *and let it melt in an earthen Pot, then put into it by spoonfuls* ℥ iv. *of the Salt of Wormwood, stirring them together, till such time as the whole mass grows red. Then add of the Powder of Aloes, Myrrhe, and Olibanum, each* ʒ j. *of Saffron* ʒ ß. *and stir them again for a quarter of an hour, till they are incorporated. Then when the maß is cold, and you have put it into a Glass Vessel, let it melt into an Oil that will shine and be as pleasant to the sight as a Ruby. The Dose is* x. *or* xx. *drops in* ℥ j. ß. *or* ℥ ij. *of Bezoar Water twice a day.* — *Elixirs.*

Or else to the aforesaid Powder pour spirit of Wine (rectified upon the Roots of Contrayerva, or Drakes Root and Virginy Creeper) to the depth of iij. *fingers, and take out a Tincture, of which the Dose is* xx. *or* xxx. *drops in a convenient vehicle.*

Or take of the same Powder ℥ ß. *and pour to it two pints of generous Wine, dissolve it close and hot. The Dose is a spoonful twice or thrice a day.*

2. After the Party is infected and the temper is vitiated and begins to corrupt, you must use the same sort of Remedies still, though in a greater Dose, and oftener; yea, many times not onely Vinegars, but the fixed Salts of Herbs are joined with Antidotes to good purpose; in that by them the curdlings of the Bloud are dissolved, and then, when the heterogeneous particles are evaporated, and the rest forced back into their due mixture, the liquor of it at last recovers and retaineth its former condition. To these ends, though there are an innumerable company of Medicins in many Physick Books, yet I shall propose but onely one or two in this place. — 2. *Curers.*

Curing Antidotes.

Take of Bezoar Water ℥ ij. ß. *of Bezoar Vinegar* ℥ ß. *of Treacle of Andromachus* ʒ j. *mingle them by shaking them together in a Glaß, and make a draught, which let the Party take and sweat upon it.* — *A Draught.*

Take of Gascoign Powder, Roots of Contrayerva, and Virginy Creeper, each ℈ j. *to* xxv. gr. *make a Powder, and give it in a spoonful of Treacle Water, drinking thereupon a small draught of the same, or of Cordial Julap.* — *Powders.*

Take of the Powder of Toads prepared, of Powder of Claws compound. each ʒ ß. *and make a Powder, to be given in the same manner.*

Take of Bezoar Mineral ʒ ß. *of Treacle of Andromachus* ʒ j. *of Camphire* gr. vj. *of Bezoar Vinegar as much as you think fit, and make a Bolus, to be taken the same way.* — *A Bolus.*

Take of Water of Wood Sorrel, and Dragons wort, each ℥ iv. *of Scordium compounded* ℥ ij. *of Treacle and Bezoar Water, each* ℥ j. *of Pearl pulverized* ʒ j. *of Syrup of Clove-gilliflowers* — *A Julap.*

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gilliflowers (or made of the juice of Citron) ℥ ij. *of Spirit of Vitriol* xij. *drops, and make a Julap. The Dose is* ℥ iij. *several times a day, sometimes by it self, and sometimes with other Medicins.*

CHAP. III.

Of Indispositions in the Heart, and their Cures.

Indispositions in the Heart are,

NOw I have given you an account of Cordial Medicins, as they are vulgarly, though improperly called, I come next in order to treat of Indispositions in the Heart, whereby that part is really and truly afflicted, and consequently requires true Cordial Remedies or Hearts-ease. And first you must understand, that under that name of *Passio Cardiaca* [or an Indisposition in the Heart] two Distempers, somewhat different one from another, are usually signified; that is to say, a Tremour or Trembling of the Heart, and the Palpitation or Beating thereof: in both which Diseases the motion of the Heart, or the Pulse seems to be inordinate, and in some measure convulsive; but the inordinacy of the former consisteth in the quickness of its vibrations or pulsings, and of the latter in the vehemency or violence of them. I shall inquire first into the reason of this latter, and then endeavour to lay down the Theory of the other, and at length the Cure of them both.

Either a trembling, or the beating of it.

The Description of the latter.

The Palpitation of the Heart is sometimes so vehement and excessive, that it may not only be very plainly perceived by the touch, but also seen by the Eyes, yea, often heard at some distance. Besides which, it is reported by very credible Authors, that by the violent beating of the Heart, and its knocking against them, the ribs have been sometimes broken, or (in younger people) that they have been driven outward, and remained protuberant, or in a Bump.

The cause of it is inquired into.

But this motion, though it be perceptible to so many senses, yet it is not yet manifest to reason, what part is so moved, that by each pulse thereof it makes the left side of the breast to start out. I suppose all men, as well learned as unlearned, do unanimously agree, that the part so moved and strongly beaten, is the very Heart it self; but I ask them, whether the whole Body of the Heart, or onely some part of it throbs in that nature, transgressing the usual sphere of its vibration? If they say, the whole body of it is so moved, I would have them assign, whether this be performed in the Systole or Diastole, that is, the Contraction or Dilatation of it. Surely not the former; because whilest the Heart is contracted, it is plain to the very eye-sight, that the bulk of it is diminished in all its parts; nor can it be any more in its Diastole, because in that state the Heart returns onely to its natural and ordinary situation and bigness, and remains therein for some small time. Hence, seeing the Heart, according to the Laws of its own vibration, though never so much increased or heightned, cannot beat and throb so outwardly (which appears farther also, because in a fit of the Fever, when it beats most vehemently it doth not leap outward and knock against the ribs) I formerly suspected that, during this disturbance, it was in a convulsive motion, quite contrary to the ordinary pulsation, whereby the Heart, like a member that is in a convulsive agitation, is totally raised altogether and moved out of its place. But when I understood the doctrine of the Nerves more fully, I presently receded from that opinion, because it is certain that the Heart cannot be raised or carried any way whatever, by any other muscle besides its own proper moving fibres. Wherefore when I considered of this matter more seriously, at last it came into my mind, that whilest the heart is contracted, to exclude or press the bloud out of its cavities, and the point as well as sides thereof fall in and are drawn nearer to each other, yet if all the bloud cannot immediately at every systole or contraction be clearly thrown out and discharged, it must of necessity follow, that the roots of the vessels, being filled to the heighth, and very much extended, will leap up and throb with some kind of violence, and then, through the reverberation which is here made, that the whole frame of the Heart will be very much shaken.

It proceeds sometimes from the hindrance of the bloud, flowing into the Arteries.

And indeed, that this Distemper arises sometimes from such a cause, I saw it lately confirmed from an Anatomical observation. A famous and pious Divine, when he had lived a good while subject to the Palpitation of the Heart for several fits which came sometimes of themselves, and sometimes occasionally, at last began to be afflicted with

with it continually, day and night, and had a difficulty of breathing besides; and after that in a few Moneths, being as it were worn away by the constancy of so very troublesome a Distemper, he died. When his body was opened, the right side of his Heart appeared immediately swelled with congealed bloud, the auricle [or ear] whereof being likewise augmented to a vast extent, contained in it a great quantity of grumous or thick gore. The reason why these things were so, appeared presently; to wit, because the Lungs being very much obstructed, and stuffed with black, extravasated, and every way stagnant bloud, could not admit all that bloud which was continually to be discharged out of that ventricle or cavity; whereupon, whilest the Heart, which endeavoured all that it could to make a total exclusion of it, at every systole or contraction, is drawn together inwardly at the cone or tip, and in the middle, and is diminished in its bigness, the basis or bottom of it being very full, struts out by reason of the bloud which is gathered there, or sticks, or is reverberated [*i.e.* beaten back] in its passage, and being more tumid [or swollen] through the bulk of the auricle, beats more strongly, and raises it self outward. *Pract. hist.* Part I.

But to say the truth, it is not onely from this cause that the Palpitation of the Heart proceeds, because that Distemper is not always constant and perpetual, but for the most part wandering and uncertain, infesting the Heart by fits, and then again either of its own accord or by the use of Remedies it ceases. Moreover it often invades some persons, whose Lungs are sound enough and free from all consumptiveness. *It arises also from other causes.*

And yet, although this Disease may arise from divers causes, yet in all of them I am of opinion that it takes the same way still in affecting the parts. For it seems to me that the heart onely beats, in as much as upon the systole or contraction thereof, whilest the cone [or point] and sides are drawn together and straitned, the base [or bottom] of it, together with the roots of the vessels, is enlarged and swells, by reason that the bloud is gathered there, and sticks, or is repurcussed [*i.e.* beaten back] in some measure. Now that the course of the bloud in this place is somewhat hindered or rebated, is manifest from this, that whilest the heart beats vehemently and very strongly in the side, the Artery in the Wrist most commonly pulseth very languidly and weakly, as conveying but a very small rivelet or stream of bloud. Since therefore the conjunct or immediate cause and true reason of this Disease, consists altogether in a stoppage and gathering of the bloud about the base or bottom of the heart and the roots of the vessels, our business is next to enquire how many ways, and by what other causes that kind of Disease is usually produced.

Upon this occasion, that we may not much blame the fleshy part of the heart, nor the proper moving fibres thereof, this defect seems chiefly and for the most part to be imputed to the bloud, or the vessels joined to the heart. The reason of the former is sufficiently manifest, for as much as those who have watery bloud, that is less apt to boyl up and be inflamed, as Virgins that are troubled with the Greensickness, and Men or Women that have an ill habit of body, are for the most part found to be subject to this Disease, and are almost constantly used to feel the shock of it from any extraordinary quick motion of the body. The reason of which is, because the bloud, when it consists of dull and unactive particles, is not freely and nimbly thrown out of the cavities of the heart, but oftentimes stays and stagnates in them; and therefore whensoever the heart through any motion of the body is filled more plentifully with them, so that the whole quantity that is in it cannot be discharged at every systole or contraction, it labours with the greatest force imaginable, till it casts it into its own base, and the roots of the vessels, and scarce any farther; where when it is gathered together, and making some little stay, causeth the containing parts to swell, it produceth the *Passio Cardiaca* [or Indisposition of the heart] with difficulty of breathing besides. *This Distemper depends oftentimes upon the indisposition of the Bloud and the Vessels belonging to the Heart.* *The reason of the former.*

But furthermore, this Disease of the Heart doth many times happen to some persons that have very hot bloud, which is apt enough to be heated or put into a ferment. For to a great many people that are very subject to the Hypochondriack Distemper, Fits of the Mother, or other convulsive Maladies, this evil is frequent and familiar; wherefore in these cases, we may justly suspect that the Arteries joining to the heart are in the fault. By what means the obstruction of them, hindering the free flowing of the bloud out of the heart, produces the palpitation thereof, the Story just now cited, doth manifestly declare: and besides that, the shutting or filling of those vessels, caused several other ways, may produce the same effect. I knew an old man that was used for many years to drink strong, old Beer, as also Wine, and oftentimes underwent the pain of the aforesaid Distemper: which person afterward dying of a mortification in his Stomach, with continual vomiting, languishment of his spirits, and other symptoms; I opened his body, and found the body or trunk of the great Ar- *2. In the other case, either the vessels are obstructed, or convulsions.* *An Example of the former.*

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tery just without the heart as hard as any bone, or rather any stone, and the sides of it very much compressed, in so much that there being onely a crevice left, the bloud could hardly flow forth with half the torrent that it should have done. And therefore justly ascribed the palpitation of his heart, wherewith he was frequently troubled, to this cause. But it is probable that this indisposition doth sometimes proceed from the bloud that thickneth in the cavities of the heart and the vessels thereunto appertaining, and hardeneth, as it were into fleshy bits.

And the divers kinds of it are noted.

How the Palpitation of the Heart is a convulsive.

But besides all this, seeing the palpitation of the heart is oftentimes accompanied with other convulsive Distempers, as I just now hinted, we may likewise suspect that the cause thereof is sometimes meerly convulsive. I formerly (in my Book called *Neurologia*, [or a Treatise of the Nerves]) demonstrated from Anatomical Observations, that a vast number of Nerves and nervous fibres did embrace and encompass the trunks of the arteries in many places, and especially about the bottom of the heart; the use and actions whereof I thought were of that nature, that the different boylings, fluxes, and refluxes of the bloud, yea sometimes also the stagnations of it, which are usually caused by the vehement passions of anger, fear, joy, sadness, and other indispositions, may thereby be brought to pass, so far forth as those small lines or cords of Nerves do variously streighten, compress, or it may be, sometimes quite shut these bloud-carrying vessels. Moreover it is not very improbable that the fits of Palpitation in the heart do sometimes arise from those vessels being in a convulsion, and somewhat too long streightned, so that they hinder the free discharge of the bloud out of the heart. Indeed I impute (and that upon good ground too) not onely this but also those other diseases of the heart to such a cause: but as to the manner of bringing it to pass, I think I ought a little to recede from that opinion. For when I had more exactly weighed the uses and actions of the Nerves, I found at last that neither they, nor their branches did either draw or streighten the parts one jot, but that this whole affair was performed altogether by the fleshy fibres, and that the nerves did onely convey fresh supplies of spirits and instincts or inclinations to the performing of new motions, into these moving parts: in the same manner as they do to the membranous fibres, in order to the perception which is in them.

To what end so many nerves are inserted into the coats of the Arteries.

Whilest therefore I seriously inquired for what uses so many nerves as are disseminated through the coats of the vessels, should serve; at last I found that those Arteries contract and extend themselves by their own strength, as well as other parts about the heart, and that for the performing of their motion both natural and forced, not onely supplies of spirits, but the causes of their inclinations to move, were brought into them by those nerves. For it is plain from Anatomical Observations, that the middlemost coat of every Artery, is manifestly muscular, and consists throughout of fleshy fibres, such as those are in the Stomach, Guts, and some other entrals. Which annular fibres, encompassing the body or trunk of the Artery on every side, as it were, with a thick row of small hairs, have, without question, their Systole and Diastole, or Contractions and Extensions, as much as the heart it self. Wherefore it is altogether necessary, that whilst the fibres of the Heart, and then these of the Arteries are successively and regularly contracted, the bloud be rapidly driven from one part into another. Wherefore it is not for nothing that some Physicians have attributed to the Arteries also a pulsifick faculty, or power to cause a pulse: for it is very improbable that the circulation of the bloud is performed by the mere impulse of the heart, as it were from a Syringe. How much more likely is it that an artery, being in some measure contracted after every wave of bloud, doth through its whole passage, push it still onward through lesser rivelets, and more contracted spaces? According to this ordinary way of driving the bloud about in equal proportion, the Arteries seem to have their constant turns of Systole and Diastole, or Contractions and Dilatations. Which though they are very swift and quicker than the twinkling of ones eye, yet they are performed successively through all the parts of the arterial Pipe or Conduit. But seeing that we observe the equal course of the bloud to be diversly interrupted and disturbed according to the force of such and such indispositions, it must necessarily follow, that it proceeds from this alone, that the Arteries (by reason of the instinct which is conveyed into the moving fibres through the nerves) being suddenly in several places streightned, do either stop and restrain the current of the bloud, or push it forward more impetuously. In fear, sudden grief, shame, love, and other Passions, which cause a great consternation or confusion in the mind, it is probable that the trunk of the Aorta is so contracted and streightned by those fibres which are suddenly and long compressed, that the bloud gushes out of the cavity of the heart with great difficulty, and that but in small portions. Wherefore from the gathering and stagnation of it therein, great disturbance and oppression doth presently proceed; and then after that, if upon this stoppage of the

An Artery is endued with moving fibres.

And is moved like other muscles, or the heart it self.

And is often troubled with convulsions.

Whence the Palpitation of the Heart often arises.

the bloud there ſucceed a ſtrong and vehement pulſation of the heart to throw it out, it will of neceſſity follow, that by reaſon of the bloud which at every ſyſtole or contraction is caſt out into the baſis of the heart, and there repelled, thoſe parts muſt be very much diſtended, and conſequently muſt cauſe the palpitation of the heart. *Phar. Rat.* Part I.

But as vehement paſſions of the Mind produce this diſtemper in moſt people, ſo Hypochondriacal perſons, and ſuch as are inclined to convulſions, feel the torment of it upon every light occaſion, yea ſometimes without any manifeſt cauſe. For thoſe in whom the Bowel nerves, and thoſe of the heart, are uſually beſet with morbifick [or diſeaſed matter] in ſo much that ſuch matter being moved through fulneſs or irritation, puts the ſpirits that inhabit thoſe parts and the parts adjacent very commonly into convulſions and inordinate contractions, it frequently happens, by reaſon that the nerves which are inſerted into the roots of the Heart-arteries, are affected by ſuch a cauſe, that the fibres alſo of theſe veſſels being put into convulſions and contracted, as I have told you, produce the palpitation of the heart. How the nerves of the heart are irritated or diſturbed by a near or remote cauſe, or by the morbifick matter that ſettles either in the head, near the original of the nerves, or in the parts about the heart or Hypochondria, and are put in ſeveral kinds of convulſions, I have elſewhere ſhewn; from whence the cauſes of the palpitation thereof, as often as it is convulſive, may be deduced. *Why this Diſeaſe is familiar to hypochondriacal People.*

As to the Cure of this Diſeaſe, ſeeing the Cauſes of it are many and various, the Cure thereof ought likewiſe to be performed different ways. For as to what ſome people ſay, that thoſe kinds of Remedies which being vulgarly called Cordials, are ſaid to refreſh the heart, and to afford ſtrength to it when it is out of order, are good in all theſe caſes, is not onely contrary to reaſon, but common experience alſo. Since therefore I have formerly declared, that the palpitation of the heart proceedeth either from the ill temper of the bloud, or indiſpoſition of the arteries belonging thereunto, and that I have touched upon both the ſeveral ways of their affecting the parts, it now remains, that I accommodate or apply to every ſort of this Diſtemper a proper Method of Phyſick, together with ſelect Receipts of Medicins. *The Cure of it.*

1. Firſt therefore, if at any time this Diſeaſe proceeds from the illneſs of the bloud, the way to cure it will be chiefly to exalt or raiſe the bloud, which is too watery, and unapt to be heated, or put into a ferment, to a better temper, and to relieve or augment the active principles of it, which are depreſſed or weakened; to which end ſpirituous and ſalt Medicins of all ſorts, as alſo ſulphureous and eſpecially chalybeate ones, do conduce. Beſides which you may refer to this place ſuch remedies as are uſually preſcribed in the Greenſickneſs, Leucophlegmatia [or a Dropſie, cauſed by abundance of white phlegm] and the colder ſort of Scurvey. *By what means it is performed when the bloud is in fault.*

Take of Conſerve of Roman Wormwood, of the yellow rind of Oranges and Limons, each ℥ ij. *of Winters Bark pulverized* ℥ ij. *of Species Diacurcumæ* ℥ j. *of Steel prepared with Sulphur* ℥ iij. *of Salt of Wormwood* ℥ j. ℈. *with a convenient quantity of Syrup of Citron rind, and make an Electuary. The Doſe is the quantity of a Nutmeg in the morning and at* 5 *of the Clock in the afternoon, drinking thereupon of the following Julap* ℥ iij. *and walk about.* *An Electuary.*

Take of the Water of Cuckow-pintle Leaves one pint, and of Penny-royal, and Hyſſop, each ℥ iv. *of Water of Worms and of Snails, and of Aqua Mirabilis, each* ℥ j. *of Sugar* ℥ j. *mingle them and make a Julap.* *A Julap.*

Take of the Tincture of Antimony ℥ j. *The Doſe is from* 20 *to* 25 *drops twice a day, with the ſame Julap.* *A Tincture.*

To this place alſo may be referred the *Tincture or Syrup of Steel*, as likewiſe the *Elixir Proprietatis*, with many other Medicins.

Secondly, The palpitation of the Heart ariſeth more frequent and much ſtronger from the Arteries thereunto belonging, which are indiſpoſed; and then their fault is either an Obſtruction or Convulſiveneſs. *How this Diſtemper, when it ariſeth from an obſtruction, ought to be dealt withal.*

The former of theſe two Diſtempers is moſt commonly continual, and many times incurable; but eſpecially if it be cauſed by a conſumption in the Lungs, or from the roots of the Arteries being half filled up or compreſſed by a ſmall bony ſwelling or excreſcence. Which ſort of cauſes, if at any time they happen to be ſuch, and can be perfectly extinguiſhed, it would be in vain to endeavour the removal of them; but

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but rather take care onely that eaſe be given to the Patient by ſleepy Medicins, and his life preſerved, though in miſery, a little longer.

But it is not improbable (as I juſt now hinted) that the Arteries may be for a great part filled up ſometimes by a polypous or corrupt matter that ſettles there, and is uſually generated within the cavity of the heart, and conſequently the free and total diſcharge of the bloud out of it hindered. But as I think the way to diſtinguiſh when it is ſo, is very difficult, ſo the cure of it is no leſs rare and unuſual. When you have any ſuſpition of ſuch a thing, ſaline Medicins ſeem to be of moſt uſe, and among them, ſuch chiefly as are impregnated with volatile or acid Salt: but you muſt not uſe them both together, but ſome time before try the latter, and then (if they do not do the buſineſs) apply the former.

Medicins made with volatile Salt.

Take of the Spirit of Sal Armoniack compounded, viz. *diſtilled with Woodlice, or other things that are good againſt an Aſthma* [*a Diſeaſe in the Lungs that ſtops the breath*] ℥ iij. *The Doſe is from* 15 *to* 20 *Drops thrice a day, with a Julap or Diſtilled Water that is proper. In the ſame manner you may try Spirit of Harts horn, Soot, Bloud, and Sculls.*

Such as have acid Salt for their ground or baſis.

Take of Sea Salt or Vitriol diſtilled, and often cohobated or rediſtilled with ſpirit of Wine impregnated with Pneumonick herbs [*or herbs good for the Lungs*] ℥ iij. *The Doſe is from* 15 *to* 20 *drops the ſame way. For theſe uſes Spirit of Tartar, of Guiacum, and of Box, are uſually prepared.*

The Cure of this Diſeaſe when it ariſes from convulſions in the Arteries.

3. The Palpitation of the Heart is oftentimes a convulſive Indiſpoſition, and is uſually produced from the like cauſe and manner of illneſs as other hypochondriacal or aſthmatical maladies are. The Cure whereof ought alſo to be attempted by Remedies that are good againſt Convulſions: but you muſt take care to make choice of them with ſome diſtinction, according as the Diſeaſe happens, either in an hot or a cold temperament of body.

In reſpect to the former, the following Medicins may be taken.

A Spirit.

Take of Spirit of Amber Armoniack ℥ iij. *The Doſe is from* 15 *to* 20 *drops twice a day, in the Julap, or diſtilled Water that is appropriated to it. In the ſame manner you may give Tincture of Tartar, Steel, or Antimony, at ſeveral times.*

Of the trembling of the Heart.

How the trembling of the Heart differs from the Palpitation of it.

The trembling of the Heart (which goes alſo under the name of the *Paſſio Cardiaca* [or Indiſpoſition of the Heart] is a diſtinct, nay a quite different Diſeaſe from the Palpitation of it. For in that, the fleſhy or moving fibres of the heart it ſelf onely ſeem to be affected, nor doth the cauſe of the Diſeaſe lie in the Bloud or the Arteries belonging to the Heart, as in this other Malady [of the Palpitation] it doth.

The Deſcription of it.

The trembling of the heart may be very well deſcribed to be a Convulſive twinging, or rather trepidation of the fleſh thereof; whereby the motive fibres make very quick, but abrupt, and as it were half turns of their ſyſtoles and diaſtoles, or contractions and dilatations, with great ſpeed, but contracted onely half way; ſo that the Bloud cannot be brought into the cavities of the heart, or carried out of them, but by exceeding ſmall portions.

The reaſon of this depends upon the doctrin of the Muſcles.

The ſum of it.

Seeing this Diſeaſe is a convulſive motion of a certain muſcle, to wit, the Heart, for the more full underſtanding of it we ſhould refer to this place all that I have elſewhere diſcourſed concerning the Motion of Muſcles, and likewiſe what I have ſaid of Convulſive Diſtempers. Nor will I be tedious in repetitions; onely obſerve in one word, that every muſcle conſiſts of two tendons and a fleſhy belly; and that the contraction thereof is performed by the animal ſpirits leaping forth from the fibres of both thoſe tendons into the fleſhy ones, which whileſt they blow up, or inflate, and tumifie [or make to ſwell] they thereby ſhorten and contract them; but when that motion is over, the ſpirits return into the tendons, and the fleſhy fibres are relaxed, or ſlackened again.

Since the moving faculty is twofold, to wit, either voluntary, or meerly natural, in the former I obſerve that the ſpirits are called forth out of the tendons into the fleſhy fibres by the command of the Appetite, and that they remain within them in action, till by its order they are diſmiſſed; and then that they return into the tendons and are at quiet, till they are again commanded forth; ſo that the times of their motion and

and reſt are unequal, uncertain, and variouſly determined, according to our pleaſure. *Phar. Rat.* Part I.

In the mere natural way it is quite otherwiſe; for the animal Spirits are diſcharged out of the tendons into the fleſhy parts with a perpetual or conſtant reciprocation [or motion to and fro] and having made a ſhort contraction in them, flow back immediately out of theſe into thoſe, and ſo on the contrary: after which manner the heart it ſelf, the Arteries and Organs [or inſtruments] of reſpiration, yea the fleſhy fibres of the Stomach and the Guts alſo, (unleſs their objects are otherwiſe determined) are agitated [or moved] by perpetual Syſtoles and Diaſtoles [or Contractions and Dilatations.]

According to theſe ordinary courſes are the actions of both thoſe moving faculties performed. Which notwithſtanding, according as the animal Spirits, that are executors of ſuch motions, ſtand variouſly affected, are uſually perverted or diſturbed in ſeveral manners. For it is ſufficiently evident, that the inſtinct of every contractive motion, which is to be performed by any muſcle, is conveyed by the nerves from the Brain in general, or the Cerebellum [the hinder part of the Brain] according to the command of the appetite, or the neceſſity of nature; that is to ſay, the animal Spirits that are within the paſſages of the nerves, being excited according to the impreſſion made upon them from the head, and moved in their whole train, do preſently rouze up the others that inhabit in the tendons, and put them into the like motion; after the ſame manner almoſt, as if a man ſhould ſet fire to ſeveral heaps of Gunpowder at a diſtance with a lighted match. As long therefore as thoſe ſpirits, both at their original, to wit, within the Brain, and alſo in their conveyances, to wit, in the paſſages of the nerves, as likewiſe at the end, where they are planted within the tendons, are regular and orderly; the firſt of them form the inſtinct of [or inclination to] each motion; the ſecond convey it, and the third at laſt put it in execution: but if the ſpirits that are deſigned for motion, are preternaturally [or unuſually] affected in any part, and forced into diſorders, immediately thereupon convulſive motions are raiſed in the reſpective members or muſcles. After what manner through any morbifick cauſe, Convulſions happen near the original of the nerves in the head; and in what manner alſo, through its being ſetled within the nervous paſſages, they are cauſed elſewhere, I have at large declared in another place; that is to ſay, in as much as the ſpirits that flow within the nerves being irritated or diſturbed by ſome preternatural and vehement cauſe (and pierced as it were, or ſtung by a Breez or Gadfly, whileſt they run ſwiftly into theſe or thoſe parts) carry unnatural and falſe ſignals of ſuch motions, as are to be performed, it muſt of neceſſity follow, that there will happen contractions, or violent and convulſive diſtentions in ſome or others of the muſcles, or membranes. I have clearly laid down the ſeveral ſorts and true natures of theſe kinds of Indiſpoſitions in my Book called *Spaſmologia* [or a Treatiſe of Convulſions]; but yet, having there permitted ſomething that makes for our preſent purpoſe, I do here further obſerve, that there are other ſorts of Convulſions, which without any preſent or great indiſpoſition of the Brain or Nerves, ariſe chiefly and almoſt onely from the faultineſs of the animal ſpirits that are inhabitants in the very tendons themſelves.

The convulſive motions of Muſcles are explained,

And diſtinguiſhed.

Some private convulſions belonging to the Muſcles onely.

Of this ſingular, and as it were private Indiſpoſition, there are two ſorts that offer themſelves to our obſervation. The one is commonly known, wherein the ſpirits oftentimes without any command [from the appetite] guſh out of the tendons, and blowing up the fleſhy fibres ſtrongly, and with ſome diſturbance, do not quickly or eaſily retire. The other, though leſs notable, yet is frequently ſeen; that is to ſay, that in which the ſpirits of the muſcles cannot remain long either within the tendons or within the fleſh, but being exceſſively diſquieted, make excurſions and incurſions to and fro out of the one into the others, and contrariwiſe, very frequently, but weakly ſtill, and in diſorder, even againſt the inclination of the Appetite, or of Nature. Concerning theſe Convulſive Indiſpoſitions (becauſe as yet they remain almoſt untouched by moſt other Phyſicians, and the knowledge of them conduces very much to the explication of the Nature and Cauſes of the *Paſſio Cardiaca* [or Indiſpoſition of the Heart], I think it worth while here to ſubjoin ſome few words, though it be foreign to my deſign, and as it were, a digreſſion [*i.e.* going out of the way.]

Two ſorts of them.

The firſt Indiſpoſition of theſe two, which in Greek is properly called Τέτανος (and is uſually both in ours and the French Tongue, known by the name of the *Cramp*) ariſes moſt commonly from this, that the animal Spirits without any bidding, as it were, flow out of the tendons (one or both together) of their own accord into the belly of the muſcle; whence they do not commonly with any ſpeed return, but ſtaying a long time within the fleſh, blow up [or inflate] them very exceſſively, and make them extraordinary con-

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contractive; and then seeing the other muscles do not either give way to these, or conspire with them in their contraction, the part grows stiff, strained with the greatest pain that can be. The cause of this is a certain heterogeneous or strange flatulent kind of matter, which descending through the nervous passages, together with the juice thereof, into the muscles, and sticking to the spirits, makes them elastical or springy, and at the same time obstinate too; in so much that they cannot be contained within the tendinous fibres, but desiring greater space to move, run out into the flesh, and remain there till the tumour or swelling of them is allayed.

The latter is a kind of Trepidation in a Muscle.

2. To that latter sort of Convulsive Motion properly belongs the Passion or Trembling of the Heart. And to this place you may refer that Indisposition which is vulgarly known, and familiar to a great many People; to wit, that sometimes they feel very frequent and equal shootings or trepidations of any muscle, suppose in the Lip, Cheek, Eyes, and other members: which when they have lasted perchance for two or three minutes, cease of themselves. It is not long ago since I was advised with, by Letters sent hither out of *France*, in the case of a certain person of quality, whose Muscles were all almost perpetually throughout his whole body in such a trembling condition; in so much that the outward part of his flesh leaped up, as it were, on every side, and did exactly imitate the vibrations or pulses of the heart.

The true reason of it.

The true nature of these Indispositions as well as of the Trembling in the heart, seemeth to consist in this, that the animal Spirits belonging to any muscle, being disturbed, and as it were, set on gadding, gush forth continually out of the tendons into the flesh, and then return, perpetually repeating their excursions and incursions to and fro; in the mean time when they go forth with onely small forces, so as not fully to blow up the fibres, and that they stay but a very small while in them, they cause endeavours to move, which though they are extraordinary frequent, yet they are but weak and very little; in so much that the members and limbs are not moved from place to place, but the muscles being so perpetually agitated, and the heart, whilest the trembling thereof remains, though it be swiftly concussed or shaken, yet can scarcely or not at all drive about the bloud; as plainly appears from the smalness, and as it were, trembling of the Pulse, and a faintness in all the parts.

Their Causes.

As to the causes of these Distempers, that is to say, the conjunct or immediate and the original causes from whence the spirits in the muscles grow so unsteddy, or gain that desultory [or unconstant] quality, it seems, that some heterogeneous and elastical matter that is transmitted through the Brain and the nervous passages, is at last discharged into the muscles and their tendinous extremities; where, growing or sticking presently to the spirits, it irritates them exceedingly, and sets them as it were a madding, so that they cannot rest in any one place, but run to and fro continually, and in the mean time either omit, or do not strenuously perform their due offices.

It is not rightly imputed to the Spleen.

The cause of the Trembling in the Heart, is commonly imputed to the Spleen; for it is commonly supposed, that from this the Entrals being obstructed, or otherwise out of order, ill vapours are raised to the Heart; which smiting of it, compel it to shake and tremble in that manner, yea make it stiff, as it were, with cold. The belief, or at least the probability of this opinion is built upon this, that hypochondriacal (or which is almost the same thing, splenetick) persons are very subject to this Disease of the Heart. What and how great the influence of the Spleen is upon the Heart, I have formerly and largely declared. From which, and partly from what I have just now said, it sufficiently appears, that that opinion, though never so commonly received, concerning the Hearts being affected or disturbed by vapours, is a trifling one, and altogether erroneous. But whereas those that are taken commonly for splenetick and likewise hysterical people, are so commonly troubled with the trembling of the Heart, the cause is from that great affinity and intimate communication which there is between the bowel nerves and those of the Heart; in so much that not onely the disturbance of one part makes the other sympathize or consent with it, but if at any time the convulsive matter gets into the branches of the nerves that belong to the Spleen or Bowels of the lowest Belly, it seldom happens but that it seizes also upon the nerves belonging to the Heart.

The Heart is not disturbed by Vapours.

The Cure.

As to the way of curing this Trembling in the Heart, since it is a Distemper meerly convulsive, for that reason, not cordial Remedies, but rather cephalick ones (or such as affect the head and nerves) are most proper; which notwithstanding ought to be either hotter or colder, or sometimes of one and sometimes of another nature, according to the temper and constitution of the Patient. To make short of the matter, seeing three sorts of Remedies are usually most beneficial in this Distemper, to wit, such as are made of Shells, of Steel, or impregnated with volatile Salt, I will lay down in this place some Receipts, and the ways to use each of them.

First

First therefore when you have made provision by such things as purge the whole body, and made a choice of such Physick as seems of most use to you, prescribe in manner following. *Phar. Rat.* Part I.

Take of Coral prepared and of Pearl, each ʒ ij. *of both sorts of Bezoar, each* ʒ ß. *of the whitest Amber* ℈ ij. *of Ambergrise* ℈ j. *make a Powder. The Dose is* ʒ ß. *twice or thrice a day, with Distilled Water, or the Julap appropriated for it.* — *Powders.*

Take of Powder of Claws compounded ʒ ij. *of Powder of the roots of the male Pæony, and of dead mans Scull prepared, each* ʒ j. *of the Flowers of the male Peony and of Lilly of the Valley, each* ʒ ß. *make a Powder, to be taken the same way.*

Take of Ivory and red Coral pulverized, each ʒ iij. *of Species Diambræ* ʒ j. *of the whitest Sugar dissolved in a convenient quantity of Orange-flower Water, and baked into Tablets* ʒ vij. *Make, according to Art, the weight of each Tablet* ʒ ß. *and let the Party eat one or two several times in a day, when he will.* — *Tablets.*

Take of the Conserve of Flowers of Lilly of the Valley ℥ vj. *of Powder of Coral prepared, of Pearl, Ivory, and Crabs eyes, each* ʒ j. ß. *of Vitriol of Mars* ʒ j. *a convenient quantity of Syrup of Coral, and make an Electuary. The Dose is from* ʒ j. *to* ʒ ij. *twice a day, drinking thereupon a draught of the following Julap.* — *An Electuary.*

Take of Orange-flower Water, and of a whole Citron, each ℥ vj. *of the rinds of Oranges, distilled with Wine* ℥ ij. *of Sugar* ℥ ß. *and make a Julap.* — *A Julap.*

Take of my Syrup of Steel ℥ vj. *The Dose is one spoonful in the morning, and at five of the Clock in the afternoon, with* ℥ ij. *of the prescribed Julap, without the Sugar, or with distilled Water.* — *Syrup.*

Take of the Powder of Ivory and Coral, each ʒ ij. ß. *of Species Diambræ* ʒ j. *of Salt of Steel* ʒ ij. *of Sugar* ℥ viij. *of Ambergrise dissolved* ℈ ß. *and make the weight of each Tablet* ʒ ß. *The Dose is* ʒ iij. *or* iv. *twice a day.* — *Tablets.*

Take of fresh Strawberries viij. *pints, the outward rinds of* 12 *Oranges, of the filing of new Iron* ℔ ß. *and when you have bruised them together, pour to them of white Wine* viij. *pints. Let them ferment in a close pot for* 24 *hours, and then distil them with the common instruments.* — *A distilled Water.*

Take of spirit of Harts horn, or Bloud, or the like, ʒ iij. *The Dose is* 20 *drops twice a day, with a convenient vehicle.* — *A Spirit.*

Take of the Flower of Sal Armoniack, and of Coral prepared, each ʒ ij. *The Dose is* ℈ j. *twice a day.* — *Powders.*

Take of Chrystal Mineral ʒ ij. *of Salt of Amber* ʒ j. *of Salt of Harts horn* ℈ j. *mingle them. The Dose is from* xv. *to* xx. gr. *twice a day with Distilled Water.*

Of an intermitting Pulse, or such a Pulse as beats sometimes, and then leaves off.

Among the Distempers of the Heart may be reckoned also an Intermitting Pulse, and that very reasonably; because in this Malady, or at least in some sort of it, the Heart it self is put into a disorder, though in a manner somewhat different from what it is in the palpitation or trembling of it: for in these it is ill and irregular in respect of its motion, but in that it labours even in its rest: for this sometimes is twice as long, as according to its ordinary course it uses to be.

Concerning this Distemper we must first distinguish; because there are (if I am not much mistaken) too different reasons of it. For though sometimes the Pulse intermitteth, because the Heart, for that time, ceases to move; yet furthermore you may perceive by your feeling that the Pulse seems sometimes in the wrist to intermit, whilest the Heart may be felt to beat very swiftly and incessantly in the Breast; as is evident in the trembling of it. The reason of which I take to be, because when that Distemper of the Heart comes upon it, there is but a very small portion of the Bloud is thrown forth into the Aorta at every Systole or Contraction. Wherefore when that is emptied and grows lank, as wanting its due measure which it should drive

Two sorts of intermitting Pulses.

The first, which happens by default of the Aorta.

Phar. Rat. Part I.

forward, leſt it ſhould trouble it ſelf too often to no purpoſe, it ſometimes intermits its contraction. This ſeems juſt like the disburdening, or (as the Seamen ſay) unlivering of a Ship; for when the Commodities in the Cargo are with difficulty and very hardly unloaded, the Porters that are to carry them away, eſcape ſome turns of going to and fro. Moreover in malignant or mortal Fevers, if the Pulſe at any time be thick and weak, it likewiſe now and then intermits. The reaſon of which is, not that the heart ſometimes ceaſes to move, (for even at that time eſpecially it labours continually) but for as much as the bloud is not poured forth in a ſufficient quantity into the Aorta, that Artery wanting work enough to imploy it, is ſometimes idle.

The ſecond, which proceeds from the heart it ſelf.

But beſides this, the Pulſe ſometimes intermits, becauſe the contraction of the heart it ſelf is for ſuch a time ſuſpended, and the pauſe or reſt of it is twice as long as it ſhould be; which any man may eaſily perceive either in himſelf or any other perſon, by laying his hand upon his own or their Breaſt, yea thoſe that are troubled with it, are very ſenſible in themſelves, by the pain and oppreſſion of their breaſt, how often the heart ceaſes to move. Beſides, this Diſtemper doth not commonly invade your languiſhing, dying, or dangerouſly ſick People, ſo much as it does thoſe that are very hearty, and for the moſt part well in health: wherefore it ought not always (according to the vulgar opinion) to be taken for a Diſeaſe, or a very dangerous and fatal Symptom. Thoſe that are ſubject to this Diſtemper are uſually troubled alſo with a Dizzineſs, Headach, or Convulſions. But this defect of the Heart is in its nature very various; for the periods of its intermiſſions are ſometimes certain, and determined to ſome one beat of the Pulſe (ſuppoſe) the third, fourth, fifth, or any other, ſooner or later; and ſometimes they are uncertain and fleeting, ſo that the ceſſation happens one while after fewer, and another time after more pulſations. The vibrations of the Artery whileſt they are continued, are ſtrong and brisk enough, and are for the moſt part equal; but ſometimes the firſt beat after the intermiſſion is the greateſt, that which is next, a little leſſer, and ſo they grow leſs and leſs inſenſibly, till the intermiſſion comes again; and then afterwards, a great beat at the beginning deſcends, as it were, by ſteps into a ceſſation again.

But is not always an ill token.

Several ſorts of it.

I have known ſome People that (as far as I could perceive by my obſervation) had an intermitting Pulſe continually, in ſo much that whenſoever I touched the Artery, I found it ſo, and yet in the mean time they ſeemed healthful enough, and complained of no other ailment: but I have obſerved ſome others that had a Pulſe, more ſlow than uſual, and intermitting, onely when a grievous Headach or ſome great pain in that part was either upon them or a coming.

The cauſe of it.

From hence I ſuppoſe it is manifeſt, that the cauſe or true reaſon of the Diſtemper juſt deſcribed, depends not upon the mixture or temper of the bloud, but onely upon the irregular conveyance of the animal Spirits out of the Brain into the Nerves belonging to the Heart, and thence into the tendons thereof. For we may well ſuppoſe, when thoſe nerves are ſomewhat obſtructed, that the animal Spirits do not come down with ſo full a tide or ſtream as they ſhould do, into the tendons of this Muſcle; wherefore when the ſtock of them is ſomewhat deficient, the motion of the heart ceaſes ever and anon for one beat, till the ſupplies of ſpirits being reinforced, its action may be renewed: ſo I have ſeen a Mill that was driven about with a ſmall ſtream, when the Water falls ſometimes and is almoſt exhauſted, ſtop for a little while; and then again, when the ſtream riſes, immediately repeat its rounds, and go again.

The way to know, when it is coming.

Thoſe whoſe pulſe, though in it ſelf great and ſtrong enough, is uſed to intermit, are not onely ſubject to Headachs and Dizzineſs, but moſt commonly to the *Incubus* or Nightmare [a Diſeaſe ſo called] and ſometimes alſo to the Apoplexy. For if it happen, that the Nerves belonging to the Heart, which before hand are not open and free enough, are afterward wholly obſtructed or ſtopped up, it follows of conſequence, that the heart (which is the chief agent) being rendered immoveable, that the fabrick of an animate Body muſt wholly ceaſe to move, and for that reaſon, to live.

The Cure of it.

Though this Diſtemper hath oftentimes no preſent inconvenience or danger in it, and therefore doth ſtand in need of too ſpeedy a Cure; yet for preſervations ſake, and to prevent worſe Diſtempers, ſome Remedies and a Method ought to be uſed in order to its Cure, at leaſt it will be convenient that in all the remaining part of a mans life, he take a care to keep a regular way of Diet: and beſides that, ſome ſmall courſe of Phyſick, which muſt be conſtantly obſerved in the Autumn, is very requiſit: that is to ſay, that as much as is poſſible, all the Seeds of Diſeaſes that are ſown in the Brain, or apt to be generated there, muſt be removed or prevented. To this end I refer you to that cautionary Method, with the Remedies againſt the aſſaults of an Apoplexy, which I have elſewhere preſcribed.

The

Phar. Rat. Part I.

The Anatomical Deſcription of an Artery.

Becauſe I have formerly told you that ſome Diſtempers, commonly taken for Indiſpoſitions of the Heart, proceed rather from the Arteries than the Hearts being affected; and that the diſorders of the bloud, which are uſually cauſed upon the diſturbances of mind, ariſe from the irregular contraction of thoſe veſſels; I therefore in this place think it ſuitable and worth the while to give you a brief Anatomical Deſcription not onely of Arteries in general, but eſpecially of thoſe that belong more immediately to the Heart, together with their uſes and offices; and that the rather, becauſe though the Ancient Phyſicians have diſcourſed very largely upon theſe veſſels, yet the New or Modern Doctors, attributing the whole circulation of the Bloud in a manner onely to the heart, have been very little concerned about the Arteries.

The coats of an Artery according to Gallen.

First therefore, to recount to you what the Ancients have ſaid, *Galen* in his Seventh Book of Anatomy *Chap.* 5. ſays that every Artery conſiſts of two coats, to which (ſays he) we may add a third and a fourth. Again in his Third Book of Natural Faculties, *Chap.* 11. he ſaith, that Arteries have coats, as the Stomach hath, and that the inner coat hath long and oblique fibres, but the outward coat tranſverſe ones. How and with what agreement to his words the thing appears to my obſervation, I ſhall now briefly ſhew you.

The way to go about it.

To perform this enterprize aright, take out a portion of the great Artery or the Aorta either of a Man or an Ox, which when you have drawn upon a ſtick (upon which it may be kept at full ſtretch) dip it ſeveral times in boyling hot water, ſo the tunicks or coats and fibres being ſomewhat contracted and more ſwollen, may be the better diſtinguiſhed and plucked aſunder; then, when you have made a ſeparation of them with a knife, you will ſee four ſeveral coats. The outmoſt of them being thin and nervous ſerves for a covering to the whole veſſel, and hath on its outſide many nervy branches, that creep about it every way; but in the inner ſurface it is covered with a texture or web, as it were, of all ſorts, but eſpecially bloud-veſſels, reſembling a Net, and very thick all over. The Arteries aſcending originally from the *Vaſa Coronaria*, and then on every ſide from the trunk of the Aorta and the branches thereof, are ramified [or branched] in this coat, together with the veins that are ſent forth from the *Vena Cava*, and the arms or branches of it. Moreover the ſprouts of the Nerves which meet with them both are variouſly complicated; and by that means, being all woven, one in another, they make a kind of Net, which covers the Pipe of the Artery all over; out of which exceeding ſmall ſprouts, of each kind of Veſſels, are propagated into the other coats of the great Arteries that lie under.

It hath four coats.

The deſcription of the outmoſt and inmoſt.

The ſecond is glandulous.

2. After this Net-like coat comes another, which is glandulous, or rather that other ſticks cloſe to this which lies upon it. This membrane being all over full of ſmall white glandules, is juſt of the ſame nature as the inner glandulous coat of the Stomach and Guts, which lies under the hairy veil, on the backſide of which there is alſo a plat or complication of Nerves in form of a Net.

The third is fibrous and muſcular.

3. In the third place there is a muſcular or fibrous Coat; that is to ſay, which is made of tranſverſe or annular fibres joined very cloſe together. Theſe fibres being fleſhy and deſigned for motion, encompaſs the body of the Artery, not in a ſingle and thin row, as they are laid in the Vein-coat, but in a kind of heap, placed one upon another, they make a very thick skin. The heaps or ranks of them, in a par-boyled Artery, may be very eaſily ſeparated, and plucked from each other; and they ſeem (juſt like thoſe of the Stomach and Guts, that I formerly deſcribed) fleſhy and deſigned for motion.

The fourth is nervous and hath ſtrait fibres.

The fourth and inner coat of an Artery, which inveſteth the hollow of it, and covers the coat that lies under it, is thin and almoſt onely membranous. The ſmall fibres of it being nervous and ſtretched out lengthwiſe, cut the annular fibres at right angles, and I ſuppoſe that theſe are the ſtraight fibres, of which *Galen* and other Anatomiſts ſo often make mention: but thoſe that they call oblique ones, I am of opinion were onely imaginary, becauſe we cannot find them any where in this veſſel. But it is evident that this errour is very common among ſome Phyſicians, to aſſign, in moſt of the *Viſcera* or Entrals and membranous parts, ſtrait, tranſverſe, and oblique fibres, out of a falſe ſuppoſition, that in every one of them there was an attractive, retentive, and expulſive faculty, and that the fibres of thoſe three ſeveral ſorts did perform theſe three offices; all which, to any one, that narrowly looks into it, will appear to be falſly concluded and ſaid *gratis*. In the mean time I ſo far agree with *Galen*, that I acknowledge, there are four coats in an Artery, and that they are in this veſſel juſt as they are in the ſtomach; except onely that in the *Viſcera* or Entrals, the Net-like

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complication of Veſſels, together with the glandulous coat, is placed under the fibrous or muſcular coat, but in the artery above it.

The uſe of the Coats.

So much for the make of an Artery in general and the conſtitutive parts thereof: as to their offices, it ſeems to me, that the muſcular coat, which is furniſhed with fleſhy, round fibres, is of moſt principal uſe and operation. For this, as I hinted before, obeying the motion of the heart, in driving the bloud about, obſerves its conſtant turns of Syſtole and Diaſtole, or Contraction and Dilatation; for whileſt the fleſhy fibres of it are ſucceſſively and with wonderful celerity compreſſed behind the ſtream of the Bloud, the courſe thereof muſt of neceſſity be moſt rapidly performed, from the heart to the ends of the Arteries.

It is fibrous, that it may make its Syſtole and Diaſtole.

The other coats are made for the uſe of this.

As for the other coats and the veſſels diſtributed about them, they ſeem all to be deſigned for the ſole convenience and uſe of the muſcular coat. For firſt the nerves and their branches, being diſſeminated all over the trunk of the Aorta and the greater arms thereof, appear on the outſide, and according to their uſual manner, carry ſupplies of ſpirits into the fleſhy and moving fibres that are under, whereby to make them able to undergo the task of their Contractions or Syſtoles; and likewiſe convey to them the inſtincts or impreſſions of ſympathetical contractions, as I before demonſtrated. Then the leſſer arteries (which are the next in order) that cover the inner ſurface of the outmoſt coat very thick, perform a double duty toward the muſcular coat that lies under them, as other arteries do to other muſcles and ſolid parts: that is to ſay, they convey and bring the nutritive juice wherewith they are nouriſhed and grow, and the elaſtical particles for the continual ſupply of the ſpirits; and then the veins, which are yoke-fellows to the arteries, carry back all the bloud that is not beſtowed another way.

The uſe of the glandulous coat.

But whereas theſe bloud veſſels which are planted without the muſcular coat, and complicated one among another, make up a net-like Plat or Web, from which there go only very ſmall and ſlender ſprouts (as it is alſo in the Stomach and Guts) though in moſt other muſcles theſe veſſels are interwoven with the fleſhy fibres, and therefore make them look red; the reaſon of this difference ſeems to be, becauſe it is convenient that the bloud-veſſels ſhould be placed a little apart from the moving fibres of the Aorta and the Viſcera, at ſome ſmall diſtance, leſt peradventure the bloud running through them too copiouſly, ſhould be ſometime or other obſtructed, and thereby cauſe an inflammation, or an abſceſs, which is preſent death. Wherefore for the greater ſecurity againſt ſuch an accident, the glandulous coat ſticks always faſt to the net-like complication of thoſe veſſels; to the end, that the ſuperfluous ſeroſities [or ſerous, wheyiſh parts] which come out of the Nerves as well as Arteries, and are not immediately carried back by the veins, may be preſently received in thoſe innumerable glandules, and kept there till they are returned into the bloud, leſt they ſhould run into the moving fibres and put them into convulſions.

In an artery the Plat of Veſſels above the muſcular coat is otherwiſe than in the Viſcera or Entrals; and the reaſon of it.

But whereas the net-like Plat or complication of the veſſels and the glandulous coat that ſticks to it, is in the Aorta, placed above the muſcular coat, and in the Viſcera, below it; the reaſon, if I miſtake not, is this, to wit, that thoſe little veſſels which ought to ſupply bloud and juice very gently and moderately, may be removed to a diſtance from the heat and violence of that bloudy torrent within the Aorta, as much as poſſible. But in the Stomach and the Guts, there is a neceſſity for the aforeſaid heat of the bloud, in order to the right performance of the offices of concoction.

The uſe of the inward coat.

The inward coat of the Aorta that inveſteth the cavity thereof, ſeems chiefly to be deſigned for theſe uſes, to wit, to cover the channel of bloud on the inſide, and bound the other parts of this veſſel: but beſides that, it will be neceſſary to grant that it hath ſomething of ſenſe, and perchance of motion too. For being furniſhed with nervous fibres, it is affected like the cavity of the heart, by the bloud that paſſeth through it; and therefore according to the perception of this part, the muſcular coat is put upon quicker or ſlower, equal or unequal motions of ſyſtole and diaſtole. Moreover this coat hath, near the heart, for the ſpace of about two inches ſtrait or larger fibres that run lengthwiſe, and are as it were fleſhy, in ſo much that I ſuppoſe, in this place, the Artery (in order to a greater impulſe or forcing of the bloud) is compreſſed and ſtreightned behind the ſtream of bloud, not onely in breadth, but (as it is in the heart) that at every ſyſtole it is ſomewhat contracted and ſhortened in its length too.

I could add in this place a great deal more, no leſs profitable than pleaſant, concerning the ſtructure and uſes of this Veſſel; for every part or portion of an animate body, though never ſo little, affords ſuch fruitful and copious contemplation, that the Theory or Speculation of any one of them, if fully attended unto, would fill many pages, yea a whole volume. If I ſhould go on in this Digreſſion, I ſhould Treat in the

the next place concerning a Vein; but omitting the conſideration of that (ſeeing it makes little or nothing toward the explication of the reaſon of Phyſick or Pharmacy) let us paſs on to the other ſort of Medicins, called *Hypnoticks*, [or ſleepy Medicins.] *Phar. Rat.* Part I.

SECT. VII.

CHAP. I.

Of Opiates, or ſuch Medicins as make a Man ſleep.

AFter Medicins that are Cordials, Hypnoticks [or ſleepy Medicins] ſucceed according to the order of Method. For Sleep, when it comes upon one moderately and ſeaſonably, is in it ſelf the moſt cordial remedy. But this diſpoſition [to ſleep] is not uſed to overtake a man either always when, nor as it ought to do, but oftentimes diſorders us either by its unwelcome preſence, or by its too long abſence. By the right rule of Nature, Sleep and Watching ought, like *Caſtor* and *Pollux*, to give place to each other, and change turns, according to the juſt limits of their reign. This viciſſitude, as long as it is well obſerved, conduces very much not onely to the preſervation of health, but to the improvement of the faculties of our minds. But if the dominion of either be too long continued, it thereupon immediately ceaſes to be poſſible, *ut ſit mens ſana in corpore ſano, i.e.* for our mind and body to be both in health. Through immoderate ſleep, all the faculties both our natural and animal functions grow very dull, in ſo much that thereby a man becomes more fit for his Grave than Humane ſociety. On the contrary, long watching waſteth the ſtrength of a man, and either weakeneth or perverteth the powers of Life. Wherefore among ſuch Remedies as are ſuitable to our wants, the wiſe Creator hath abundantly provided for our neceſſities; to wit, that it ſhould be in our own power to cauſe or repel ſleep or watchfulneſs as often as we think it convenient; or if they be offenſive at any time either in defect or exceſs, to moderate them. What Medicins (and by what manners of operation in humane bodies, they) uſe to procure theſe wiſhed effects, lies now upon me to ſhew you; and firſt of all, I ſhall ſpeak of Opiates, or ſuch Medicins as cauſe ſleep.

The viciſſitude of Sleep and Watching is neceſſary to the preſervation of health.

That you may the better underſtand what Hypnotick or ſleepy Medicins do, and with what kind of operation upon the brain, animal ſpirits, and other parts, they procure ſleep, I ſhould repeat in this place, what I have elſewhere at large diſcourſed concerning the nature, ſubject, cauſes, and effects of ſleep. For I have demonſtrated the immediate ſubject of ſleep are the animal ſpirits, not all of them, but onely ſuch as inhabit the Brain and the Nerves, which are an appendage to it: that is to ſay, thoſe which perform the duties of all the ſenſes, and every ſort of ſpontaneous or voluntary motion; always excepting thoſe that ſerve onely to execute the neceſſary orders of meer Nature and Life.

In my Treatiſe of the Brain.

Having therefore premiſed theſe things, we muſt enquire concerning Opiates, firſt of all how they work upon the animal ſpirits, ſo that by the influence, as it were, of ſuch a Medicin, they immediately ſink and lie down, as if they were bound in Fetters, neglectful of their ſeveral offices. Secondly, We muſt ſhew in what part ſleepy Medicins begin their operation; that is to ſay, whether in the Stomach, or the Brain, or whether they do it together, or ſucceſſively in both. Thirdly, We muſt determine how far Opiates extend their operations, whether to the ſpirits of the Brain onely, and thoſe that are inhabitants of its appendages as being the onely ones that are capable of natural ſleep; or whether they reach alſo to others belonging to the Cerebellum [or hinder part of the Brain] and thoſe that rule in thoſe Regions. Fourthly and laſtly, It will be worth our while to add ſome notable effects and accidents, together with the natural account of Hypnoticks.

There are four things to be inquired into, concerning the nature of Opiates.

1. As to the firſt of theſe, that is to ſay, that it may appear how Opiates work upon the animal ſpirits whileſt they lay them to ſleep, I have given my opinion largely in another place; and I have reaſon to believe, that they do not exert their force, by raiſing vapours into the head, nor opening the pores of the Brain, in order to admit any vaporous or otherwiſe ſoporiferous matter, but onely by deadning or defeating ſome-

1. How Opiates work upon the animal ſpirits.

Phar. Rat. Part I.

ſome of the animal ſpirits, ſo that the reſt, being either in a conſternation, or forced inward, or at leaſt recalled from their uſual efflux [*i. e.* flowing out] into the nervous parts, may forſake their functions, or for a time remit their labour. Now that it is ſo is very evident, becauſe Narcoticks [or drowzy Phyſick] if taken in a Doſe too big, are mortal, for as much as in ſo great a quantity they overpower the ſpirits, and make it impoſſible for the vital functions to be performed. But when they are given in a due quantity, and with all circumſtances accordingly, they reſtrain the exceſſes of the ſenſitive ſoul, in as much as that they conquer and ſubdue ſome of the animal ſpirits, and totally deſtroy the reſt: by which means the ſoul being more contracted, and retiring, as it were, into it ſelf, lies down in quiet, juſt almoſt in the ſame manner as throwing Water upon a Fire that breaks vehemently out, immediately beats down the aſpiring flame, and brings it within moderate bounds.

In what ſort of particles their virtue conſiſteth

But if it be inquired farther, in what ſort of matter, and how diſpoſed, the Narcotick virtue of a Medicin conſiſts? No manifeſt quality, in this caſe, as of cold, heat, or any other kind, muſt be pretended; nor ought we preſently to fly to I know not what occult ones. A man may ſuppoſe, that Opiates conſiſt of ſuch particles as are moſt diſagreeable to the animal ſpirits, and are extinguiſhers or rather poiſons to them. It will not be eaſie to determine of what nature, or make, the contrary particles of both ſorts are, becauſe they are not perceptible to ſenſe, nor does the analogy or proportion of particles ſo oppoſite appear in any other ſubjects. But (that we venture to gueſs) I am of opinion, that ſeeing the animal ſpirits are very ſubtle bodies, compoſed of a ſpirit and a volatile ſalt, both joined together and highly exalted, the Opiates, on the contrary, are made of a ſtinking ſulphur, that is, of ſulphur united with fixed ſalt and earthy matter, raiſed to a violent degree; which kind of compoſitions, it is well known, are ſuch great enemies to the ſubtle texture of the animal ſpirits, that ſometimes at a diſtance, by meer emanations that flow out of them, though not perceivable to the ſmell, they overpower them; but their particles (when they are inwardly taken) being diffuſed through the bloud and nervous juice, poiſon, and as it were, defeat or ſlay ſome troops of the animal forces where ever they meet them. But in what places this is chiefly and primarily performed, comes now in the next place to be the ſubject of our enquiry.

In what places Opiates work primarily and chiefly.

2. When I formerly treated of Sleep, I ſhewed that this diſpoſition, according to the ordinary courſe of Nature, begins from the *Cortex* or outſide of the Brain; that is, that the ſpirits which inhabit there and keep guard, as it were, in the outmoſt confines of it, do firſt retire, and laying down their Arms, lie idle; and then immediately that all the reſt, who have the ſame leiſure, do in like manner reſt themſelves and fall aſleep.

Firſt, In the Cortex, or out-part of the brain

Thoſe firſt ſpirits, when they are going to reſt, forſake their ſtations, and either becauſe they are wearied, and weakned as to their forces, ſpontaneouſly relinquiſh their Poſts till ſuch time as they are recruited; or becauſe they are beaten thence, or becauſe they are enticed inwardly by ſome allurement. The firſt of theſe happens ordinarily every day, through the influx or inundation of the nervous juice and ſometimes of the ſerous liquor. For thoſe humours being poured out of the bloud (when it is full) which runs through the outmoſt borders of the Brain into the cortical or exteriour part thereof, fill all the pores and paſſages, and conſequently reſtrain the ſpirits, and hinder them of their free expanſion, whereby they grow watchful. The reaſons why, and the manner how all theſe things come to paſs, I have already declared at large, in another Treatiſe: from which, when they are well conſidered, it will be rational to ſuppoſe, that the particles of every Opiate, after it is taken, when they are tranſmitted into the bloud, and have circulated with it, do exert their drowſie quality moſt chiefly upon the *Cortex* [or, as it were, the Bark of the Brain,] that is to ſay, that they in this place meet with the firſt party of animal ſpirits, and that they defeat, or rather deſtroy a great many of them that are in the forlorn hope; by which means afterward the remaining ſpirits of the ſame troop, being now grown weaker, retreat,

When they kill the outmoſt ſpirits, they make the next to them retire.

and ſeeing their emanation is ſtopt, fly back toward the middle of the Brain; and whileſt theſe thus withdraw themſelves from the Battle and march off, all the reſt that are placed in the organs of ſenſe, as it were in ſo many Watch-Towers, having loſt their recruits, ſtrait follow them, and leaving their Guard, retire to take their reſt.

They leſſen or recall the afflux of them to the nervous parts.

In this manner the particles of Opiates cauſe ſleep, in as much as they defeat and deſtroy ſome animal ſpirits that ſtand in the front of the Battle, near the cortex of the Brain, and by that means repel all that are near them, putting them ſo to flight, that the influx of them into the ſenſes is ſuſpended: but by what means, and that ſometimes in ſo ſhort a time (as now and then it falls out) to wit, preſently after the Medicin

dicin is taken, and scarce yet dissolved in the stomach, sleep creeps upon a man (since one would think it should require some time for the sleepy particles to be conveyed from the stomach into the bloud, and afterward by way of that into the brain) is not easie to determine. To this I answer, First, That the way from the stomach through the bloud to the forepart of the head is easie enough, and may be gone over in a little time; but besides that, I am induced to think, that Opiates sometimes, by working more immediately upon the stomach, and by the meer contact thereof, before they have any commerce with the bloud, do in some measure invite us to sleep. Among the evident causes of this effect I have elsewhere justly assigned, oppression of the stomach: For how many are there that grow immediately asleepy by eating gross meats that are hard of concoction and disturb or over-burden the stomach? The reason of which seems to be, that seeing there is a very near relation and intimate sympathy between the spirits of the stomach and those of the brain, in so much that each of them mutually bear the afflictions and misfortunes of the other (which is easie enough to be made out by many and many instances) from hence it easily comes to pass, that through the extreme oppression of those spirits which preside in the stomach (in that they are hindred, and as it were repelled from their free expansion) immediately the substance of the whole soul (and especially that most principal part which governs the brain) is at the same time contracted, furls its sails and submits it self wholly to the yoke of sleep. How much more reason have we to suppose, that when ever the spirits of the stomach, imbibing the opiate juice, are poisoned and destroyed in great numbers, that immediately all those which keep guard about the Brain, are quite defeated, and oppressed with sleep, which is not onely the image of death, but sometimes also the same thing as death it self? Indeed I have elsewhere related a story concerning such an effect as this from the taking of *Opium*, which is very true, though very strange; that is, of a certain strong man pretty well in health, who having taken too great a dose of *Laudanum*, to ease him of the pain of the Colick, complained immediately of an intolerable oppression in his stomach, and a dizzines or drowsines, and within twenty four hours died; nor did he fall into any sleep before he took his last.

Pharm. Rat. Part I.

The reason of it.

These are the chiefest and most usual places (that is to say, the Stomach and the cortex of the Brain) in which Opiates, by exercising their virtues begin or end their invitations to sleep. But besides these, it is apparent from common observation, that when they are given several other ways, they imprint a kind of drowsines upon the whole sensitive soul, or upon some portion of it, which is naturally and ordinarily capable of sleep. A plaister of *Opium* applied to the forehead, and likewise a Clyster impregnated with the dissolution of it, cause sleep. The like effect some have found, to their sorrow, by putting it into an hollow tooth or into their nostrils; so that it is evident, this Medicin, when ever it can be admitted to the animal spirits, destroys the next of them that come to hand by mere contact: and that sometimes to such a degree, that there ensues upon it a contraction or dejection of the whole soul (which is as it were put into a commotion) and an eclipse or fainting of all the principal faculties: not but that it is also very likely that some particles of the *Opium* are conveyed out of those places through the bloud into the cortex of the brain.

3. Having already pointed out the Arms of Opiates, by which they execute their baneful effects, and the Scenes where they primarily or chiefly act their Tragedies; it comes next before us, to inquire concerning the sphere of their activity; that is to say, upon what particles or parts of our bodies they work, and how far they extend their virtues into them. For what hath been said it is plain enough that they work upon the animal spirits; but the question is, whether they do not also reach the bloud and other humours? Indeed the very small dose in which they are given, makes me think the bloud is not tainted by them: for from the littleness of that, it seems to me very improbable, that the whole mass of bloud should be poisoned, or corrupted; and likewise becaus Narcoticks (though frequently administred, cause no such marks or risings in the skin or entrals, as are usually seen when the bloud is any way venomed. Moreover those people who make *Opium* so familiar to them that it doth not hurt their animal spirits, though they take it daily, and in great quantities, feel no distemperature in their bloud. But in the mean time, we must not imagine that the particles of *Opium* are agreeable to the bloud, and assimilated by it, but rather that they are heterogeneous altogether, and unmingleable; wherefore they no sooner get into the mass thereof, but they are presently expelled by it again; and thence being partly poured into the cortex of the Brain, cause sleep; and partly being cast forth through the pores of the skin, produce sweating, and many times a very troublesom itching, as I have observed in many cases. As to other humours, truly there is no reason to think that

3. How far the virtue of Opiates is extended, and into what parts.

They do not poison the bloud, as they do the spirits.

Phar. Rat. Part I.

that Opiates leave any ſtain upon the *Serum*, the nervous liquor or the nutritive juice; in ſo much that their virtue and operation ſeems to reſpect the animal ſpirits onely.

Opiates work chiefly upon the animal ſpirits.

But yet they do not affect all the animal ſpirits alike; but Opiates given in a moderate doſe, do primarily operate upon thoſe ſpirits onely, to which the priviledges of natural and ordinary ſleep are allowed, not ſo much as touching or moleſting any of the reſt. Wherefore when a man takes *Laudanum*, it binds both his inward and his outward ſenſes, though in the mean while pulſation, reſpiration, and all the duties of concoction and ſeparation are performed after the uſual rate; and after a certain ſpace of time, the ſpirits of the ſort aforeſaid, when their forces are recruited, rouze up themſelves again, and ſhaking off the chains of ſleep, return of their own accord to their wonted watch and ward.

Sometimes their force reaches the Cerebellum, or hinder part of the brain.

But if an opiate Medicin be ſtronger than it ſhould be, it doth not onely lay fetters, wherewith they are a long time ſhakled, upon the ſpirits which inhabit the brain and the appendages thereof, but it alſo extends its drowſie powers into the other Territory of Lifes Dominions; ſo that after a larger doſe of it than ordinary, the appetite is moſt commonly rebated, reſpiration very much ſtreitned and rendred not onely difficult, but alſo unequal, nay ſometimes alſo the motion of the very heart is ſo far impaired, that immediately the pulſe grows weaker, with a cold ſweat, and a dulneſs, or a kind of faintneſs in all the faculties, in ſo much that ſuch a Medicin is ſometimes attended with a perpetual ſleep; the reaſon of which is, becauſe the poiſon of the *Opium* being diffuſed a great way, gets into the Globe of the *Cerebellum*, and deſtroying or ſubduing the ſpirits that inhabit there in great numbers, cauſes the motion of the heart firſt to grow weaker, and after that, quite to ceaſe; ſo that the vital flame is thereby extinguiſhed.

4. The good or bad effects of Opiates.

Having premiſed theſe things concerning the nature, the manner of operation, and the ſubjects of opiate Medicins, together with their limits and ſphere of Activity, I muſt now at laſt recount to you the effects and principal accidents, both good and bad, that uſually attended the uſe thereof; and then give you ſome cautions touching the right method of Hypnotick Phyſick. Firſt, Therefore let us ſee, in what manner and in what caſes theſe opiate Medicins are commonly beneficial.

1. The good reſpect either the Spirits or the Bloud and Humours.

The good or emolument that is uſually procured by the uſe of Opiates, belongs either to the animal ſpirits, or to the bloud and humours: of which the firſt are affected primarily and more immediately, but the two laſt onely ſecondarily, and by mediation of the former.

Whenever the animal ſpirits, being excited above meaſure, act either too much, or irregularly in the diſcharge of their ſeveral offices; Narcoticks given in due time, afford very frequently great aſſiſtance toward the allaying of their fury and diſorders.

They are good for the Spirits in reſpect to ſenſe and motion. To both in a different kind.

Now ſuch exorbitancies in them as ſhew when Opiates are proper, reſpect either Senſe or Motion. The former of which functions being twofold, the greateſt exceſſes of the internal ſenſes, are Watching, and being Mad or Delicious; but the indiſpoſition of the outward ſenſes, that moſt requires this kind of Phyſick, is Pain. Inequality, or irregularities of motions, which are to be reduced by Narcoticks, are firſt of all a violent pulſe, convulſions in the heart or bowels, and likewiſe the exceſſive and impetuous evacuations of the latter. So many there are, and ſuch different caſes, wherein, whileſt the animal ſpirits, like wild Horſes, run up and down, or leap over their bounds, they ought to be reſtrained or reduced by Opiates, as with a bridle. Several inſtances of each whereof, together with the manner, how they are prepared, and the reaſons of their operations, I ſhall here briefly ſubjoin.

In reſpect of the inward ſenſes, to watching.

1. Firſt therefore Opiates are neceſſarily and moſt properly uſed in caſe of Wakefulneſs; in as much as Sleep, which is a ſtate quite contrary to it, and conſequently cures it. How many ways and by what means watching is uſually cauſed, and continues long upon a man, I have lately declared at large in a Treatiſe which I have written; in all which caſes, ſeeing the animal ſpirits, being too wild and much diſturbed, exert or ſhew themſelves more briskly than they ſhould do, bloating and irradiating [or enlightening] not onely the organs of ſenſe, but eſpecially the outmoſt borders of the Brain in all parts; the particles of *Opium* being tranſmitted hither by conveyance of the bloud, do preſently deſtroy or ſubdue the animal ſpirits that keep guard in the front of the Army, in ſo much that all the reſt that are neareſt to them, being forced inward are put to the ſtand, and much reſtrained from flowing all around into every part; whereupon immediately all the outward ſpirits that inhabit the organs or inſtruments of any ſpontaneous ſenſe or motion, being bereft of the influx of thoſe in the Head-quarters, forſake their Guard alſo, and retiring inward, lie down and reſt themſelves.

And 2. Madneſs.

Secondly in Delirious caſes, Opiates are oftentimes uſed with good ſucceſs (though other-

otherwhiles they rather do miſchief, as I ſhall hereafter declare) the reaſon of which is, that when the ſpirits, being too much excited, and as it were, ſet a madding, within the Brain, can eaſily leap over the uſual and trodden paths of their conſtant journies; then a Narcotick Medicin arriving at the borders of the Brain, reſtrains thoſe exceſſes, which are uſually as apt as Hounds to run beyond their ſcent, and for a time hinders them from all motion; ſo that many times when they move afreſh, they return to their former tracts and perform their wonted functions very well. *Phar. Rat.* Part I.

Thirdly, *Opium* is always reckoned of moſt excellent uſe to allay all ſorts of pain, whereupon it is juſtly called *Nepenthe*, and is a remedy really divine. And truly we cannot ſufficiently admire, how, when any bowel or member is under any ſignal and intolerable torture or pain, this Medicin, like a Charm, gives the Party immediate relief and eaſe, yea ſometimes without ſleep, or at leaſt before it comes upon him. But that, which is yet more wonderful, is, that as long as the particles of *Opium* continue to work and exert their Narcotick power, yea ſometimes alſo when the ſleep is over, there remains in the part affected, the greateſt alleviation and freedom from pain. But afterward when the force of the Medicin is ſpent, the torments preſently return, nor do they abate of their cruelty, unleſs they are again inchanted by the ſame Medicin. *In reſpect of the external ſenſe, for pain.*

Whileſt I inquire into the reaſon of this I cannot eaſily find out in what part a pain-removing Medicin [called an Anodynous Medicin] chiefly operates and exerteth its virtue, whileſt without ſleep, or when that is over, it alleviateth pains, and for a certain time gives a man perfect eaſe: that is to ſay, Whether the Narcotick power of it be laid out upon the part tormented, or upon the common organ of ſenſe, or upon the whole ſenſitive ſoul. The reaſon of the difference between the parts propoſed, is becauſe pain cauſed in one place is felt in another, and the effect of it is diffuſed through the whole ſoul. The continuance of it conſiſteth in this, that the nervous fibres are very much irritated and pluckt from each other, by ſome incongruous and very diſproportionate matter, in ſo much that the ſpirits which are in them, are immediately diſtracted, and being forced from their equal expanſion, are put into a confuſion. But the ſenſe of pain is cauſed from this, that the diſturbance of thoſe ſpirits being conveyed by a kind of undulation [or waving, as water doth when you throw a ſtone into it] through the nerves to the common ſenſe, to wit, the *Corpora ſtriata* [parts ſo called from their being ſtreaked] moves the ſpirits that inhabit there, into the like diſtraction; which ſort of commotion, proceeding farther into the *Cerebellum*, ſtirs up the imagination, and thence immediately returning, diffuſeth, or ſpreadeth a diſturbance or inquietude through the whole ſubſtance of the ſpirits. Since therefore Pain is a malady of ſo large an extent, and of ſo different a nature, we ought to inquire what ſphere of activity Anodynous [or pain-removing] Medicins have. *How Opiates remove pains without ſleep, or after it.*

Concerning this there is no room to doubt, but that whenever after the taking of *Opium* Sleep is firſt brought upon a man, he is conſequently free from all pain; for then an ἀναλγησία [or freedom from pain] immediately enſueth as the effect of it; in as much as thoſe ſpirits alſo which actuate the common ſenſe are bound up with them that inhabit the Brain; and conſequently, though the tormented part be never ſo provoked, all ſenſe of pain is obſtructed; but whereas when the Patient awakes and remaining ſo, performs ſome animal functions very briskly without any pain, for ſo many hours after he hath taken the Opium, and that when the force of the Medicin is quite ſpent, immediately the ſame torture returns upon him, this ſeems a queſtion for *Oedipus* or *Apollo* himſelf to reſolve.

For the ſolution whereof, we cannot ſay the ſpirits of the part affected, and thoſe that reſide in the common ſenſe; that is to ſay, that the one or the other, or both of them together, are bound by the Anodynous Medicin. For it is not credible, that the particles of the Opium do ſo penetrate and deeply enter into the brain and nerves, that when they have paſſed through that without hurting of it, they ſhould deſcend in ſo ſhort a time to the utmoſt borders thereof; nor can we imagine that the ſpirits which reſide in the *Corpora ſtriata* (ſeeing that when the Party is awake, he continues for ſome time without pain) and are awakened to receive any impreſſions of other ſenſibles, grow deaf onely to the approaches which are made from the part that is in pain. Since therefore this freedom from pain after ſleep is over, ought not to be referred either to the part affected, nor to the common ſenſes being ſtupified by the Opium, let us ſee how the reaſon of it may be deduced from a kind of Narcotick indiſpoſition of the whole ſenſitive ſoul. Now that will eaſily appear, when we have premiſed theſe two things. *The reaſon of it.*

Firſt, That it is neceſſary to the creating or continuance of any pain, that a plen- *It conſiſts in theſe 2 things.*

Phar. Rat. Part I.

tiful quantity of ſpirits flow ſtill in the part affected; for the heat of ſuch ſpirits, whileſt they riot there, their diſtraction and the mutual ſtriking of ſome againſt others, are the very immediate cauſe of ſuch a troubleſom perception as is called *Pain*; wherefore if by the ſtreightning of the nerves the afflux of ſpirits to the part that is grieved, cannot be hindered or much diminiſhed, the pain muſt of neceſſity ceaſe, becauſe the ſpirits being bereft of freſh ſupplies and ſuccours, will lie ſo thin and ſcattered in the fibres, that they can ſcarce touch one another, at leaſt they will not at all break out into fury and indignation.

1. There is required to make pain, a copious flowing of the ſpirits to the part affected. 2. Which Opiates hinder.

Secondly, That deſtitution or withdrawing of the ſpirits which is here required, and cannot be procured by no other means or endeavour, is often and uſually produced by Opium. For from the particles of this Medicin beſetting the borders of the Brain, not onely ſome of the outmoſt ſpirits, which are as it were, fore-runners or Scouts (as they call them) are deſtroyed, but the firſt ſources of them within the body of the Brain and Cerebellum, and their efflux thence into the nerves, are preſently very much ſuppreſſed; in ſo much that during the operation of the Opium, they are diſcharged much more ſparingly and minutely into the heart, bowels, and all other parts. Hence it is that the pulſe and the reſpiration remit ſomewhat of their vehemency and quickneſs, and ſometimes on a ſudden the one becomes weak and the other difficult, and many times alſo an unuſual languiſhing and dulneſs ſeizes all the limbs and joints. Moreover, hence it is that the *viſcera* or Bowels, which before were put into convulſions, either of an expulſive nature (that is to ſay, by Vomiting or Stool) or of a painful nature (as in the Colick and Stone in the Kidnies) lay aſide their diſorders: to wit, for this reaſon, becauſe that whileſt the ſupplemental and recruiting bands of ſpirits in the part affected are deficient, thoſe few that ſurvive, have no longer leiſure for tumult and rage: but on the contrary, in order to their being altogether quiet and ſafe, they lie ſtill: but then afterward when the particles of Opium are blown off and ſcattered, and the ſtock of ſpirits in the Brain, and their emanation thence into the nervous parts, is renewed, ſo that they flow down again with a full ſtream to the parts affected, and fill their fibres, immediately the ſame convulſions or pains return by reaſon that the ſpirits are again increaſed and provoked, as they were before.

For the ſame reaſon Opiates remove Convulſions.

No queſtion, but according to this manner of operation, and according to the reaſon juſt now aſſigned, Opiates moſt commonly allay the greateſt pains, and give a man eaſe, either with or without ſleep, yea and continue it for ſome certain time even when that is over: which ſpace or interval being paſt, the pains immediately return, and are in a ſhort time increaſed to their wonted ſharpneſs. This kind of effect wrought by Narcoticks, which is vulgarly known in the cure of the Scorbutick Colick, ſeems like ſome Exorciſm or Charm; in as much as the pain, like a Dæmon or evil Spirit, cannot be bound but for a certain time, and then begins to play its pranks and rage again. Among thoſe painful maladies for which Opium is a cure, the Gout and Stone in the Bladder are juſtly numbred in this place. For in gouty pains that Anodynous Medicin affords many times extraordinary help, and ſuch as is almoſt divine. The latter of theſe diſeaſes, ſeeing it rages cruelly in old men, and cannot be cured by cutting, admits of no other remedy but Narcoticks for its relief. Whereupon I have perſuaded ſome perſons to a conſtant and daily uſe of *Laudanum* or *Diacodium*; which they have done with great eaſe to their life, and ſuffered no injury by it, though they have daily increaſed the doſe of it, and riſen to a great quantity. So much for the means of healing or helping, which Opium uſually furniſhes, in order to the regulation of the ſenſitive faculties: let us ſee at laſt how much this *Panacæa* [*i.e.* all-healing Medicin] conduces to the allaying or curing the irregularities of animal motions.

They are good in the Gout and Stone.

2. The immoderateneſs or irregularity of the moving faculty, for the right compoſing whereof, the uſe of Opiates is proper, reſpect moſt principally the Heart and Bowels, (for Convulſions about the head or limbs do not ſo neceſſarily require this kind of Phyſick) to the firſt of which we muſt refer the Pulſe and Reſpiration, as often as either of them is more quick or vehement than it ſhould be. For ſeeing that in Fevers, the motions of the heart and lungs, growing more vigorous, drive the bloud about very rapidly, in ſo much that it is exceſſively perverted both in the heat and temper of it, and cannot diſcharge its dreggy parts which are ſo intimately mixt with it, the force of thoſe parts is ſomewhat rebated by giving of a Narcotick; ſo that the bloud circulates gently and temperately, diffuſeth it ſelf with leſs heat, and being diſſolved in its conſtitution, caſteth forth its ſerum and impurities by Sweat and Urin. Opiates extenuate and depreſs the actions of Pulſation and Reſpiration, for that they in ſome meaſure ſtop the flux or emanation of the animal ſpirits in the Cerebellum, and

2. How Opiates cure the irregularities of motion.

1. They diminiſh the vehemency of the Pulſe and of Reſpiration.

and diminiſh the ſtream of them from thence into the nerves deſigned for the heart; which if it be done to exceſs, there enſues upon it a great dejection of the vital faculties, which ſometimes proves mortal.

They regulate the diſorders of Reſpiration.

Reſpiration (not onely as it is vehement, but alſo) ſometimes as it is interrupted, convulſive, or otherwiſe in ſeveral manners irregular, doth frequently require Narcotick Medicins; which are uſually good, above all other Remedies, in Coughs that are vehement, or very frequent and continually troubleſom to a body. But in fits of the Aſthma, wherein through the great pains and labour which the organs are put to, the Patients ſeem to be even in the very pangs of death, a doſe of a good Opiate, like ſome Divinity, makes all things preſently ſerene and calm. Of which the reaſon is, that in thoſe Maladies, where any thing that is troubleſom beſets the moſt vital parts, the ſpirits that reſide in them being exceedingly provoked, break out into outragious diſorders, and by over-acting their parts, diſturb and pervert the whole ſtate of things; wherefore, when after you have taken a Narcotick, and bereft thoſe furious ſpirits of their ſupplies, they are preſently extenuated, and being as it were deſtitute of all ſuccours, lay aſide their inordinate practices. Moreover, Narcotick Phyſick ſeems no leſs neceſſary againſt the immoderate or convulſive motions of the Bowels, to wit, of the Stomach and Guts; for it is uſed oftentimes to give very great eaſe in extraordinary vomiting, and exceſſive or violent purging. Dyſenterical Maladies [or fluxes] can ſcarce be cured without Opium; not becauſe this Medicin fixeth juices and humours that bubble and are irregular, but it ſtops the expulſive convulſions of the fibres, and that partly within the cavities of the Bowels themſelves, by ſtupifying the ſpirits which reſide there with its meer contact, and partly by ſuppreſſing the ſpirits within the Cerebellum, which would flow thence into thoſe parts; of whoſe ſuccours they being deſtitute, do eaſily relinquiſh their convulſive motions. I could upon this occaſion recount to you either the convulſions or pains of other parts, which are uſually allayed or removed by Opium; but I have already ſaid enough of the operation and effects of this Anodynous Medicin, which are exerted primarily and chiefly upon the animal ſpirits; let us therefore next enquire, what power and alterative force it hath upon the bloud and humours.

How Opiates work upon the bloud.

Now that Opiates operate upon the bloud and humors of our bodies, and do reſtrain their diſorders, there is ſcarce any one of the Vulgar but knows, and is ſatisfied. In Catarrhs and Defluxions of all ſorts we fly many times to theſe as the laſt *Aſylum* or Refuge. Theſe very powerfully ſtop all bloudy evacuations, as alſo thoſe of the Serum, which, when at any time they are exceſſive and colliquative [or of a diſſolving nature] they reſtrain or reduce. They repreſs the immoderate ebullition of the bloud when it is in a feveriſh heat, and take off the exceſſive inflammation thereof. In fine, they moſt ſucceſsfully allay all waves and ſtorms raiſed in our bodies, upon almoſt what account ſoever, and oftentimes reſtore to the bloud, when it is diſturbed, a ſerene and quiet temper.

Though theſe kinds of effects are in a great meaſure produced by mediation of the affections of the animal ſpirits (as I have formerly hinted) for in as much as the nervous fibres being inordinately contracted, diſturb the bloud and humours, and force them to ſeveral fluctuations and exundations [*i. e.* floatings and overflowings] for that reaſon the ſuppreſſion of thoſe Spaſms by Opiates, makes the Sea of them calm again) yet it ſeems probable alſo, that the Opiate particles, whileſt they are confounded with the bloud, create in the liquor thereof ſome kind of alterations by their meer mixture. For I told you before, that they are altogether heterogeneous, immiſcible [or unmingleable] and likewiſe untameable: and therefore ſeeing they appear to be not all enemies or injurious to the liquor of it, they may in ſome ſenſe be taken for Antidotes; that is to ſay, ſuch ſort of Antidotes, as being mixed with the bloud, paſs through the maſs thereof quickly, and almoſt untouched, and in their journey make way for the ſerum, and other recrements or malignant impurities that are cloſely ſhut and bound up with it to go out, yea drive them forth before them, by opening all the pores and avenues. Whereupon it is not altogether without reaſon, that Opium is an ingredient in the compoſitions of the chiefeſt Antidotes, as Treacle, Mithridate, and Diaſcordium, as if it were a reſiſter of venomous humours.

How the Opiate particles work upon the bloud.

Indeed that the particles of Opium, when a man hath ſwallowed it, is ſoon tranſmitted into the bloud, and quickly paſſeth through the maſs thereof, appears from this, that they immediately after the Medicin is taken, being carried up into the Brain, procure ſleep, and give a man eaſe from pain. And beſides that, it is evident from common experience, that they (where they are agreeable) provoke Sweats and bring away Urin, in ſo much that theſe effects are commonly reckoned among the Virtues of Opium. Moreover that the particles thereof are not venomous to the bloud, but

They ſoon paſs through the bloud.

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And therefore are called Antidotes.

rather Antidotal is collected from this, that in the Plague, Small Pox, and malignant Fevers, yea in any other Fevers *Laudanum* is given many times with great succes. In the mean while I do not well understand those qualities which some men attribute to this Medicin, that is to say, of fixing and thickening the bloud; unless perchance it be said to do so, in as much as that by opening the constitution thereof, it causeth the serous part of it to be copiously separated and carried off, so that the liquor which remains grows thereby more compact and thick.

They cause Sweat and urin.

A notable History of their Efficacy.

For as I have found by frequent observation, that Opiate Medicins do dissolve the bloud, and sometimes, like Antidotes, most powerfully provoke Sweat and Urin, so from the following Story (which I add here for to sum up all) I will make it as plainly out to all the World. I was formerly consulted upon the score of a Gentleman who was very much disordered in his body, and troubled with nocturnal pains which proceeded from the Pox (which was either very illy or not at all cured in him) to whom I prescribed many things, but all in vain; because he being very much averse to Physick, would take scarce any thing else except a dose of *Laudanum*, which I gave him once or twice a Week to alleviate his pains. In a short time growing hydropical, he swelled with an *Ascites* [a Dropsie that makes the belly swell like a Bottle] and likewise with an *Anasarca* [a Dropsie that affects all the flesh] to that degree, that he could hardly turn himself from one side to the other without the help of Servants. When he was in this condition, I being sent for to him again, and finding him averse to the Rules of Physick, did all that could be done; and that was onely to give him warning of his death, which was not far off, and certainly to be expected, that he might compose and fit himself for Eternity. He, being not much troubled at what I said, desired me very earnestly, that in order to his dying so much the more easily, he might take my *Laudanum*, which I had permitted him to take before in a small quantity, when he pleased, or at least every night; which having with some admonitions granted him, I went away, and as I thought, bid him the last farewel. Afterward he took that Medicin daily, and as daily increased the Dose, so that in a short time he had consumed an incredible quantity of it. By using this onely Medicin constantly, he grew better and better every day, and within a Moneths time was so well, that being free from all swellings and pains, he had a good stomach, and walked abroad. By the daily use of this Opiate, his Distemper, which troubled him very much before, left him; and being every night dissolved into a great Sweat, he also made a vast quantity of Urin. I could here tell you likewise of many other cures of Diseases that were thought past cure, which were performed by the help of Opium alone; but because it would be tedious, and somewhat beside my purpose, I therefore shall onely add in this place one or two, which are in short these.

The second Story.

About three years ago, a noble Lady, after an Autumnal Fever, fell into a severe Colick, with vomiting, and sharp pains, that afflicted her Bowels and Limbs most miserably. Remedies of all sorts, both outward and inward, though applied for several Weeks with great care, did her no good at all; but the poor Lady within 20 days was reduced to such a languishment and extenuation or thinness of Body, that there was but very little or hardly any hopes of her recovery: for being confined to her Bed, and almost always without sleep, she was troubled with a constant pain or sickness in her stomach, throwing up all she swallowed, whether Physick or food, by vomit, and likewise she underwent almost continual torment and pains about her belly and loins, as also sometimes in her head and limbs. Being sent for to her, I tried many sorts of Medicins, but nothing agreed with her except a Dose of *Liquid Laudanum*; which I ventured to give her to alleviate her pains, at first onely twice a Week, and that not without fear and caution. She at last desired that she might take that Medicin every other, and after that every night continually. So having used daily without any damage, she gained in the night time sound sleep and pleasant, and in the day time a freedom from pain and a good stomach; and by that means gathering up her crums again, she began to rise out of Bed, and daily to eat good meals; but then she could and had a desire to take other Medicins, till at last she was quite well again.

The third Story.

Nor did a very fine Woman, who for many years was subject ever and anon to pains of the Colick, any less cry up and celebrate the praises of this divine Medicin. For whensoever she was sick of that Distemper, and was in most miserable torment, she could not be relieved by any other Medicin except Opium: wherefore she took a Dose of it every night, till such time as the morbifick or diseased matter being quite spent, she at length became free from all trouble and pain.

CHAP.

Phar. Rat. Part I.

CHAP. II.

Of the Injuries and Inconveniences of Opium; *to which are added Cautions concerning the Use thereof.*

HItherto I have shewn you the good effects, and as it were, the Angelical face of Opium, together with the manner and reasons of its operation. But if you look upon the other side of it, (as when you turn the reverse of a Coin) it will appear altogether like a Devil; and therein we shall discover no less hurt, and ill effects, than we did good ones in the former. For there is so much poison in this All-healing Medicin, that we ought not to be by any means secure or confident in the frequent and familiar use of it. Wherefore we ought to be admonished as well concerning the loss as the profit that accrues from it, so that we (like those that go a Voyage to Sea, when we understand on both sides, what Ports we may touch at, and what Rocks we must avoid) may incur the less danger.

How many and what ways Opium useth to hurt us.

I have by the sad experience of some People, found that the use of Opium sometimes is noxious, and of ill consequence; in as much as some men immediately after the taking of it, have fallen into an everlasting sleep, and others by an excessive or unseasonable Dose of it, have either shortened their lives, or made them ever after troublesom and unhappy by the hurt it hath done to their principal faculties. Instances and examples of this kind are every where to be met with from the practice of Quacks and Empericks. I remember some that by swallowing a Pill of *Laudanum*, have presently been put into so profound a sleep, that they could never be wakened. They lived indeed for three or four days, and were pretty well, as to their pulse, breathing, and warmth, but were not to be recovered by any remedies or tortures to their senses, or made to awake. Yet I have observed some others, who having taken Opium, have slept but moderately, yea sometimes very little or scarce at all; but as to their pulse, respiration, and heat, they have been immediately worse: for they used presently after the taking of this medicin, to languish, and thereupon more and more to fail of breath; nor could their strength be repaired by any Cordials, but they fainted and died insensibly. I have elsewhere told you a Story of a strong man, who was killed with Opium, having no sleep before that which was his last, that is to say, Death came it self upon him. He complained as soon as he had taken the Medicin, of an extraordinary oppression and cold at his stomach, and by and by was taken with an excessive languidness, together with a dejection of all his spirits, and a chilness in his extreme parts, [the Feet, Hands, &c.] and within four hours, complaining often that his eyes grew dim and were quite blinded, he expired.

The poison works first upon the Brain, and then upon the Cerebellum, or hinder part of the Brain.

For hence it is easily gathered, that Opium doth not destroy life onely one way, and that the same still, but that it hath two principal methods at least by which it kills men. The reason of one consists in this, that the particles of the Medicin taken, do first and more immediately affect the Brain; and of the other, that they do in the same nature work upon the Cerebellum. As to this latter the business is thus: if, after the Medicin is taken, it happen perchance, that the circuit of the Cerebellum be so beset by the Narcotick particles, that the outmost spirits being immediately extinguished, the afflux of the inward ones toward the heart, be diminished, and so by degrees cut off; it will of necessity follow, that the Heart and all the instruments of Respiration, will first grow fainty in the discharge of their vital functions, and by that means totally cease from their labour, though in the mean time the Patients awake, and are free from all drowsiness, well enough in their senses, and very lively as long as they live. But if the opiate particles break in first, and with a full force upon the borders of the Brain, and set upon the inhabitants of that chiefly, in so much that having presently conquered the outmost spirits, they put all the inward ones that are in the middle of it, into a consternation, and so far suppress them that they cannot rise again to rally their forces a second time, then immediately a deep sleep, or an invincible and perpetual slumber ensues, though the pulse in the mean while, and the respiration continue for some time in their due state.

Besides these kinds of destructive Tragedies which Opium upon several occasions acts upon the life of man, this Medicin hath likewise many other ways of doing hurt, whereby it oftentimes is injurious to some private function or part of the body. It would be tedious to reckon up all the sorts of lesser evils, which Narcoticks are at any time the cause of, and therefore in this place I shall onely tell you what maladies happen

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happen in the head, what in the Breaſt, and alſo what in the lower belly, by the improper and unſeaſonable uſe thereof.

It is hurtful to the Head, the Breaſt, and the Belly.

1. As to the firſt, it is very vulgarly known that the principal functions of the ſoul, to wit, Memory, Diſcourſe, and ſharpneſs of Wit, are oftentimes very much impaired by Narcoticks. The frequent uſe of them in many men weakens the memory. I knew a certain perſon, who by taking an extraordinary doſe of *Laudanum* when he was in a Fever, quite loſt that faculty; and after ſeveral Weeks, when the uſe of it began to return, he remembred onely ſuch things as he had done within a particular ſpace of time, but nothing of what he had before and after tranſacted. I know that ſome have contracted, by taking this Medicin, a dulneſs or ſtupidity of mind, and others grown mad. Hence it is (ſaith *Freitagius*) that whereas *Proſper Alpinus* and *Bellonius* tells us, that the *Ægyptians* and *Turks* eat Opium, to make them chearful, bold, and inclined to Venery, yet they add, that the devourers of Opium, though they ſeem to be in good health, and not at all injured by the uſe of it, yet that they are thereby rendered more frigid and their functions or faculties are much the worſe for it, that they appear moſt commonly as if they were drunk and dull; that they become heavy, ſtupid and out of order, that ſometimes they affirm a thing, and in the ſame breath deny it; ſo that they are cautious who they talk or converſe with: and that it is alſo become a jear, not unlike a reproach among them, which they caſt upon one another, *Thou haſt eaten Opium*, juſt as when our Countrymen upbraid a man with being drunk or dozed. *Freitagius* in his Book of *Opium*, *ch.* 3. The reaſon of this is plain enough, from what I have already ſaid, to wit, that Opium produces the effects now mentioned, in that it firſt and moſt principally ſtrikes at the Brain: and whileſt that there it deſtroys, or conquers ſome animal ſpirits, it prevents many others from their uſual ways of emanation, and draws them into by-paſſages. But whereas Opium is devoured by the *Turks* (and I may ſay alſo by ſome of our Countrymen too, that are fortified, and have gained a kind of Armour againſt the poiſon of it, by long uſage) in great quantity, and that without any damage, or at leaſt without any hazard to their lives; the reaſon is, becauſe the particles thereof, though at firſt they are hurtful and venomous to the ſpirits, yet by frequent uſe they at laſt grow more agreeable and familiar, as we obſerve of the ſmoak of Tobacco taken into ones mouth through a Pipe; for though at firſt for ſome days it uſually brings a giddineſs, and oftentimes a vomiting or purging, yea a cold ſweat upon us, with trembling and frequent fainting of the ſpirits, yet at length we take it undiſturbed, nay with great delight. But for as much as Opium, in a large Doſe, puts ſuch confidence and reſolution into them, that they go to battle without any dread, the reaſon ſeems to be, becauſe that Medicin by ſtupifying the ſpirits in ſome meaſure ſtounds them, ſo that they endure the encounter of all ſenſible, though never ſo terrible things. Laſtly, Whereas it is ſaid that Opiates provoke Luſt, when on the contrary they ſhould ſeem rather to ſuppreſs and tame that appetite, by extinguiſhing the ſpirits, I ſay (if it really have that effect) that the ſeminal or generative moiſture and the ſpirits that flow therein, do not deſcend from the Brain, but are poured immediately into the ſpermatick Veſſels; and therefore in as much as Opiates either hinder or diminiſh the generation of the ſpirits within the Brain, they perhaps make them run more plentifully into the inſtruments of propagation.

How Opium works upon the Turks.

2. what hurt Opium doth to the Breaſt.

2. That Opiates are ſometimes enemies to the Heart and the Breaſt is manifeſt from this, that they depreſs and diminiſh the Pulſe and Reſpiration, yea ſometimes alſo (as I have ſhewn before) cauſe to grow weak and by degrees quite to ceaſe. Wherefore in Fevers, when the bloud being extraordinarily depraved, ſeems like to have no *Criſis* [judgment to be made upon it] or at leaſt not a good one, and that at the ſame time it ſupplies but very few ſpirits, and thoſe weak too, to the animal forces, Narcoticks are moſt commonly, and almoſt continually hurtful, and as it were poiſon. For though in the Plague, and in malignant Fevers, as long as the Pulſe and the Breath is ſtrong, *Treacle*, *Mithridate*, and *Diaſcordium*, yea and *Laudanum* are many times given with good ſucceſs; yet if at any time in thoſe Diſeaſes, and in other Fevers that are not very malignant, the vital functions languiſh, we ought to uſe thoſe famous Antidotes very ſparingly, but ſtronger Opiates not at all. Moreover in a painful Cough, a Conſumption, Pleuriſie, Empyema, [an ulceration in the Lungs] and other pectoral Diſtempers, that is to ſay, in all, wherein Nature is inclined ſuddenly to evacuate that which is troubleſom and oppreſſeth the Breaſt, and takes a great deal of pains to do it, and that at the ſame time the inſtruments of breathing being deſtitute of a ſufficient quantity of ſpirits, grow weak, and perform their task with labour and difficulty, a man ought to abſtain from Opium as much as from the rankeſt poiſon: for in ſuch a caſe Narcoticks increaſe and fix the weight that ſhould be removed, diminiſhing the ſtrength of thoſe parts which ought to throw it off.

3. That

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3. That Opiates work upon the Bowels ordained for concoction, and other parts of the lower belly, giving them many times extraordinary eaſe in ſeveral reſpects, I have ſhewed you before, but that they are not always ſo amicable and kind to this region, but that they ſometimes do it great heart, is equally eaſie to prove. For Narcoticks, often taken, are very injurious to that principal faculty, to wit, the deſire of Food, or the Appetite, upon which all nouriſhment and the very root of life depends; in that they very much rebate, and many times totally deſtroy it. For when the ſpirits that inhabit the inner coat of the ſtomach, are ſtupified or deadened by the opiate particles, ſo that thoſe nervous fibres, though never ſo empty, are no more ſhrivelled or wrinkled up, then all deſire of Food ceaſes, nor do we care to eat; but if meat be offered to our ſtomach, it is immediately thrown back again, becauſe it is not a delight but a trouble to it. Moreover for the ſame reaſon the concoctive power of the ſtomach is often weakened, and the expulſive motions both of that and the Guts grow dull. For it is a common obſervation, that ſlow concoction, and dulneſs or difficulty of evacuation are the familiar and uſual effects of Opiate Medicins.

3. *And what to the Belly.*

From hence it will be no hard task to give you ſome Phyſical Rules and Cautions concerning the right uſe of Opiate Medicins; which may be done by obſerving theſe four things: that is to ſay, before you give a Narcotick Medicin, you muſt conſider:

Phyſical cautions concerning the uſe of Opium.

1. What the Patients Conſtitution is.
2. What Diſtemper he hath.
3. In what condition the animal ſpirits are, in reſpect both of the Animal and Vital Functions. And
4. In what ſtate the Bloud and Humours are.

1. As to the firſt, when an Hypnotick is proper, have a care that the temperament of the Patient, his habit or indiſpoſition of body, or his way and courſe of living do not forbid the uſe of it. For example, Thoſe that are of a middling ſtature, and a firm ſquare body, whoſe bloud is hot, and their aſpect lively and ſharp, endure this Medicin beſt, and many times take it with good ſucceſs; but will uſe it yet with more ſecurity, if they have formerly been accuſtomed to it: on the other hand it is not ſo convenient, yea ſometimes it is very ill for them that are either too fat or very lean; and likewiſe for ſuch as have ſpirits of a thinner compoſition, which may be eaſily diſſipated, or being of a cold conſtitution, have ſoft, lank fleſh, and alſo ſuch as being naturally of a dull, indocile complexion, are in themſelves heavy and ſleepy Fellows; for to ſuch this makes an addition by increaſing the weight of other things, if they have never tried this ſort of Phyſick.

1. *In reſpect of the Patients conſtitution.*

2. The nature of the Diſtemper is ſometimes of great moment for or againſt Opiates. In light caſes (according to *Septalius*) that Phyſician is a ſneaking Fool that draweth them into practice. But in ſome great caſes they are either forbidden or very much ſuſpected. In the Palſie, Swimming of the Brain, Nightmare, Apoplexy, and alſo in the Orthopnæa [a Diſeaſe when a man cannot breath unleſs he ſits upright] a Dropſie in the Breaſt or Belly, upon a Numneſs or trembling in the Limbs, in very malignant Fevers, and in the Fits of intermitting Fevers, or the criſis of others, Narcoticks are moſt commonly forbidden. Moreover in a Cough, attended with a great deal of thick ſpittle or phlegm, in an Aſthma, and all other pectoral Diſtempers, accompanied with oppreſſion of the Lungs, in the Fits of the Mother, and other convulſive Maladies, they ought not to be given but very ſeldom, and that not without caution, and the advice of a good Phyſician. But in a grievous Headach, Catarrhs, the Colick, Pleuriſie, ordinary Fevers, Vomiting, the Flux, in Fits of the Stone in the Kidnies, the Gout, and all Pains, Opiate Medicins are not onely allowed of, but we fly to them as divine, and all healing Remedies.

2. *In reſpect of the Diſtemper.*

3. But whenever ſuch Medicins are propoſed, or fall under our deliberation, we muſt likewiſe conſider, in what tenor and condition the animal ſpirits that preſide in each part are; for if through the ſmalneſs of their number, or being oppreſſed, they are already weakened, and do not ſufficiently diſplay their ſails, they ought not certainly to be any more diminiſhed or conſternated by ſuch a Medicin. Wherefore whileſt the animal faculties, either as to ſenſe, or diſcourſe, are not in good plight, or do not exert themſelves ſo nimbly as they ſhould do; or when the Pulſe or Reſpiration are either too weak or too quick, or more ſlow than ordinary, or ſtopped and unequal; or laſtly, when the limbs and moving parts are ſeized with a numneſs and weakneſs, attended with an unuſual languiſhing, we muſt altogether omit all Hypnotick or ſleeping Phyſick. But we will ſtick to put it in practice, whenever it is proper

3. *In reſpect of the animal ſpirits.*

Phar. Rat. Part I.

in greater cases, and that at the same time the animal spirits, in these and other respects are strong enough, or when they are too much expanded or raised above measure, and grow wild.

4. In respect of the Bloud and Humours.

4. In the mean time the state of the Bloud and Humours is not to be neglected; for sometimes the bad or unequal temper of these forbids all Opiates whatsoever, or permits them to be taken but sparingly, and with a kind of restriction. The Bloud prohibits the use of them, as it offends either in quantity, quality, or temper. As to the former, the bloudy liquor is either too much or too little, and in both respects excludeth all Narcotick Medicins. For first of all, if at any time the bloud being too turgent [or swelling] in quantity, and at the same time bubbles up through any feverish heat, distending the vessels to a great extremity, and thereupon the heart endeavours with all its strength to drive it about as swift as possibly it can (lest it should stagnate, or overflow in any part) repeating the turns of Systole and Diastole with all speed, then certainly to give a Narcotick, whereby to hinder the labour and last endeavours of the heart, which are so necessary for the preservation of life, would be the part of a Poisoner, rather than a Physician. Wherefore in a *Plethora* [or fulness of bloud] bloud-letting ought always to go before the use of Opium. Secondly, Nor is there less danger in Opiates, when they are given upon a defect or want of bloud, as after great hæmorrhages [fluxes of bloud] long fasting, or a great fit of sickness: for when the stream of the bloud is very small, and by reason of its smalness is scarce continued, the heart endeavours to drive it about very swiftly, and with double diligence, lest the course of it should be interrupted, and it should cease to flow. Hence it is obvious to conceive what great hurt Opiates do, which put a stop or a scatch to this motion of the heart, that is at that time so necessary. Indeed this seems to be the reason, that we forbid Women to sleep soon after they are brought to Bed, and that they bleed very plentifully, as we do any body else, after a great loss or extraordinary fluxes of bloud, lest the spirits being recalled whilest the Parties sleep, should forsake the heart, and leave it destitute of power to drive about the stream of bloud which is then diminished. Moreover sometimes the Bloud being disordered in its quality, or (to speak more properly) in its *Crasis* [or temper] forbids the use of Opiates; for whilest in an ill habit of Body or a Fever, the Bloud being very full of dregs, ought to be agitated and driven more swiftly about with a greater impulse of the heart, that the heterogeneous particles may be subdued and quickly evaporate, the operation of a Narcotick intervening, stops the motion of the heart, and consequently retardeth, and sometimes frustrates the purification of the Bloud.

As for other recrementitious humours, that are usually gathered in the stomach and guts they likewise ought to be purged out and carried away by Vomit or by Stool, before the Opiate be given: for otherwise they will fix and stick there more stiff than ever. For the fibres of the bowels being stupified by the Medicin, are not irritated as before, nor do they easily put themselves into, or nimbly perform expulsive convulsions, in order to the discharge of those recrements or dregs: wherefore if any thing be to be thrown out, it must be done before the Narcotick Medicin be taken.

CHAP.

Phar. Rat. Part I.

CHAP. III.

The ſeveral ſorts, Preparations and Receipts of Opiates.

NOw that I have delivered to you the Doctrine of Narcotick Phyſick in general, and ſufficiently explained the Reaſons and ways of its operation, my next buſineſs is to recount, and particularly to conſider thoſe Medicins that are endued with ſuch a quality, both Simples and Compounds, and ſo to make a kind of Opiological Treatiſe of it.

The diſtinction of Anodynous Medicins.

Firſt therefore, According to the Method obſerved by moſt Authors, I thought it proper in this place to diſtinguiſh ſuch Remedies as are called *Anodyna* [Medicins to remove Pain] into two Claſſes, that is to ſay, as they are ſtronger or weaker. For ſome of them being meerly Narcotick, do not onely force ſleep preternaturally, but when occaſion requires, procure a freedom from pain and a numneſs, and being unduely given, many times death it ſelf. But there are other Medicins ſaid to be of this kind, in as much as when the ſpirits are heated and in diſorder, they entice and kindly compoſe them to reſt, not by deſtroying or ſtupifying, but onely by mollifying and ſoothing of them.

1. The Roll or Catalogue of all Narcoticks.

1. To the former ſort of theſe (which are the onely ones properly called Narcoticks or Opiates) we uſually refer Poppy both white and red; and ſome other more venomous things, which for that reaſon are not to be preſcribed. But of ſome of them that are not ſo unwholſome, the Roots, Leaves, Flowers, Seeds, and thick Juices, are frequently uſed, and (as I have before ſhewn) are often taken with the greateſt ſucceſs. But ſeeing each of them have ſome poiſon mixed with them, therefore you muſt not preſcribe ſometimes one ſort and ſometimes another indifferently, as in the other parts of practical Phyſick, but trie only ſuch things as are moſt ſafe and approved by long experience. Hence cuſtom hath at laſt ſo far obtained upon us (from which we may not recede without hazard of mens lives) that Poppy and the Preparations thereof, are the baſis or complement of almoſt all Opiate Medicins. The Seeds of Henbane and the roots and juice of Cynogloſs or Dogs Tongue, are ingredients in the compoſitions of ſome Hypnoticks; but yet whenever we have a deſire effectually and ſafely to provoke ſleep, the whole force of the Medicin is placed in Opium or Diacodium. I ſhall not need in this place to deſcribe white Poppy, out of which theſe are made, nor the extraction of the Opiate Juice, or to give you the Compoſition of that Syrup, becauſe all this is done at large in the Botanical and Antidotary Books [or Books that treat of Plants and Antidotes] both of the Ancient and Modern Doctors. As to what remains therefore, and makes moſt to our purpoſe, I will endeavour to ſhew you the elementary parts of Opium, and from thence demonſtrate the virtues of both that and Diacodium, with the reaſons why they intoxicate.

white Poppy.

The Nature and Parts of Opium.

The body of Opium may be examined and diſtinguiſhed, as to its conſtitutive parts, better when it is entire and untouched, than when it is Chymically taken in pieces: For if it be diſtilled by fire, then through the plenty of impure ſulphur that is in it, it burns horridly, and at the ſame time ſends forth a very noiſom ſtink. But yet it is obvious to ſenſe that there are abundance of ſulphureous particles in this body; which alſo its naſty ſtinking ſmell and inflamableneſs do manifeſtly declare. And though it be equally certain that there are ſaline particles joined with this ſulphur, and conſequently that this body conſiſts chiefly of theſe two together, with ſome ſmall quantity of Earth; yet of what nature, and in what ſtate that Salt is, I cannot poſitively tell,; onely I can gueſs by the effects of it, that this ſulphur-ſaline body is altogether contrary and deſtructive to the texture of animal ſpirits, which is ſpirituous and ſalino-volatile. And indeed a man may gather from many inſtances that the Narcotick virtue lies in the ſulphur joined with the ſharp or aculeate ſalt, from whence it hath its ſtinking ſmell: For of this nature are white Poppy, Mandrake, Henbane, and Tobacco, and other Opiates, all which have an ill ſmell, almoſt like one another, which is very offenſive to our ſpirits whileſt we ſmell it. Moreover according as the animal ſpirits in ſeveral bodies are of a ſomewhat different texture, therefore Opiates work more virulently and ſtrongly in ſome than in others. *Turks* and *Ægyptians*, whoſe ſpirits are more fixed and leſs volatile as being generated out of adult bloud, eat Opium without any danger, at leaſt without hazard of their lives; not ſo of *Europeans*, who have more pure and ſubtile ſpirits. Dogs eat Opium in a great quantity without any ſleep or danger of death. A very ſmall doſe of it kills a Cat imme-

In what the Power of Opium conſiſts.

It doth not work the ſame way in all.

It doth not hurt a Dog, as it doth a Cat or a Man.

Phar. Rat. Part I.

immediately, becauſe the ſpirits of that Creature being very ſalino-volatile, cannot by any means endure the Narcotick ſulphur. And hence it is, that one drop of the Oil of Tobacco, put upon the end of this Animals tongue immediately creates Convulſions and a dizzineſs in it, which are attended with preſent death. I once ſaw ʒ ij. of Opium put into a piece of Bread and given to a Cur-dog; and a little while after growing very ſick he became dull or rather ſtupid, and by his difficulty and ſtriving to breath, ſeemed to be juſt a dying; but afterward within half an hour, he eaſed himſelf in great quantity with the naſtieſt ſtink that I ever yet ſmelt, and immediately grew well and luſty. Now that ſo great a quantity of Opium did not hurt this Creature, the reaſon proceeded from the extraordinary acid ferment of his ſtomach, whereby the ſulphureous particles of the Narcotick might be rebated and in ſome meaſure ſubdued; and ſo this ſulphur being very much diſſolved by the acid menſtruum in his ſtomach, his excrement came forth very fœtid or ſtinking. For we may obſerve of other bodies, that whileſt an acid works upon a ſulphureous body, it cauſes an ungrateful ſmell: For ſo it is when *Aqua ſtygia*, or ſpirit of Vitriol, is poured upon the filings of Iron. So alſo when ſpirit of Vinegar is put to a Lie made with Antimony; and I could tell you a great many other things of this ſort. But yet we muſt not deny but that the particles of the Opium do work upon the ſpirits of the Dog, which notwithſtanding reſiſt the Narcotick poiſon more ſtoutly than either thoſe of a Man, or other four-legged Animals; as appears by the Story which I juſt now told you: for that though a dulneſs, difficulty and ſtraitneſs of breath began to ariſe, by reaſon that the ſpirits of the brain were affected or overpowered with a drowſie quality, thoſe ſymptoms immediately vaniſhed as ſoon as the Narcotick matter was thrown off by purging. Moreover I knew the truth of this opinion ſtill more confirmed by an Anatomical Experiment. Many years ago I ſaw about three ounces of the Tincture of Opium, made very ſtrong in Canary Wine, and tranſfuſed into the jugular vein of a live dog. When his vein was cloſed, the Dog ran about as he uſed to do, ſeeming to be little or not at all affected with it; but after a quarter of an hour, he began to be a little dozed, to nod his head, and at laſt to fall aſleep: but we having no mind he ſhould, when we had hindered him for ſome time from it by beating, threatning him, and trying to make him run, at laſt by that means his ſleepy inclination was quite off of him, and he became very ſound and lively. From whence it is apparent, that the poiſon of Opium is either ſo far ſubdued within the bowels of concoction by their ferments, or reſiſted by the animal ſpirits themſelves, that it is not always alike in all Creatures, either ſleepy or mortal.

Some inſtances of it.

As to the heads of white Poppy, with the ſeeds of which Diacodium is made, and likewiſe Decoctions, Emulſions, and other ſleepy Confections, it is evident that theſe are much leſs impregnated with Narcotick ſulphur than the concrete juice of Opium; and that what there is in them of that kind, is much more pure and innocent. Wherefore we very often give Remedies compounded of theſe with a great deal more ſecurity. For we muſt not go ſo high as Laudanum, unleſs when through the vehemency of the ſymptoms, Diacodiate Medicins will not do the work. Moreover ſince theſe have leſs virulency in them, they do not want much preparation, but may be put to a phyſical uſe after plain boiling, infuſion, or expreſſion, or ſqueezing. But Opium is ſeldom preſcribed alone and by it ſelf, but uſeth to be corrected and compounded with various and different Preparations, that it may be made an Anodynon, ſafe enough to be taken.

Diacodiatts.

The Preparation of Opium.

The Preparation of Opium is either Simple or with Diſſolvers and Correctors joined to it. The manner of the former conſiſteth chiefly in this, that the maſs of it being cut into ſeveral ſmall pieces like Dice, it be expoſed to the heat of the Fire or the Sun ſo long, till the Narcotick ſulphur being partly evaporated, that which remains becomes friable [or fit to be rubbed in pieces] and leſs offenſive to the noſe; which Preparation of it is uſually put in practice before moſt others. For whether we would make a Tincture, Extract, or Confection of Opium, it is firſt dried and reduced into a Powder by this precedent means. Moreover to this you muſt refer the ſmoaking of it with ſulphur, in the ſame manner as we tame Scammony: for an acid vapour aſcending from common ſulphur, whileſt it flames, doth much ſubdue or weaken the virulency of both the other ſulphurs, both the Purging and the Narcotick or ſleepy.

The Opiates of the Ancients.

There are many and very different Preparations with their adjuncts, or rather compoſitions of Opium; whereof ſome have been more uſual and famous among the Modern Phyſicians. But the Opiates of the Ancients which were moſt noted are *Pilula de Cynogloſſo* [Pill of Dogs-tongue] *Requies Nicolai*, and *Philonium*, of which laſt there are four ſorts, to wit, *Romanum*, and *Perſicum*, (the uſe of which is in ſome meaſure retained even to this day) and likewiſe *Philonium Galeni*, and *Philonium Meſuæ*.

The

The Deſcriptions of all theſe are common enough to be ſeen in moſt Antidotaries [or Books of Antidotes] ſo that I need not here to repeat them. The reaſon of theſe very Anodynous compoſitions, though it ſtands upon a falſe foundation, yet in another reſpect it is found to be good enough. For upon a falſe ſuppoſition that Opium is cold in the fourth degree, many things which are hot in the ſame degree, as wild Pellitory, Euphorbium, white Pepper, and the like, are added to the *Philonia*, which have in them a great quantity of it. But they do not ſubdue the Narcotick ſulphur of the Opium and rebate its virulency, becauſe their heat oppoſeth thats coldneſs (for indeed it is not cold, but rather hot) but thoſe ſharp bodies, by being full of volatile ſalt, are the cauſe of ſuch an effect. *Phar. Rat.* Part I.

The Opiates of the Modern Doctors, upon account of the laudableneſs of ſuch a Medicin, are vulgarly called *Laudana*; and ſome alſo becauſe they remove Pain, call them *Nepenthes*. When theſe were firſt found out *Renodæus* complained very ingeniouſly, That there were a company of Quacks ſtarted up, who in ſtead of the known Pills, called *Pilulæ de Cynogloſſo*, give us a Confection of *Opium*, which they call *Laudanum*, wherewith they promiſe not onely to procure ſleep, but to cure all Diſeaſes. The Quacks (ſaith he) give ſuch an Encomium of this Medicin, that there is no Emperick, no dull Piſs-Doctor, no nor any pitiful Barber but profeſſeth himſelf a *Laudaniſt*, or an Admirer of *Laudanum*. Without doubt this Cuſtom, though the worſt that is, and moſt pernicious to humane life, is not yet laid down. For there are yet among us not a Troop or Company, but rather a Swarm of Pretenders to Phyſick; whereof each one brags of his peculiar Laudanum, which they give in every Diſtemper, or any ſtate of a Diſtemper without any conſideration; and if perchance it happen that the Patient ſleeps and wakes again, immediately they triumph and claim ſome token of preheminence, when oftentimes they deſerve a Gallows more than any thing elſe, in as much as when the Pulſe and Breath is dejected by an Opiate unſeaſonably adminiſtred, many times all hopes of a Criſis or a Cure are gone: wherefore whoſoever values their life, ought to be admoniſhed to have a ſpecial care of thoſe unskilful Laudaniſts. *Laudana, or Opiates invented by the Modern Doctors.*

Nor ought the uſe of Opiates onely, but much more the Invention and Preparation of them be denied to Empericks and Quacks: for it is the work of a good and learned Phyſician ſo to temper poiſons, that they may not prove a Venome but an Antidote. Wherefore *Laudana*, which were found out by none but skilful perſons who had long experience of them, ought onely to be admitted into practice; of which ſort there is enough already received and approved on, ſo that there needs no new ones to be daily added. The ancient *Laudana* invented by *Paracelſus, Crollius, Quercetan, Hartman*, and other famous Chymiſts, and deſcribed alſo in moſt *Pharmacopæias* [Books ſhewing how to make Medicins] are compounded onely under the form of an Extract; in all which for a foundation there is the tincture of Opium drawn forth with a fit menſtruum; to which are added other Tinctures, as of Saffron, Caſtor, (which *Guianerus* calls the *Bezoar of Opium*) of Species Diambræ, and the like; and ſo when they are all mixed together, diſtil them in a Bath, ſo that the menſtruum being evaporated, the remainder be reduced to the conſiſtence of Honey; and in fine, for the compleating of it, put into Magiſteries, pretious Powders, Chymical Oils, and other things that are reckoned Cordials: and when the Medicin is thus made up, it is moſt commonly given in the form of a Pill. *Laudana in the form of an Extract.*

Though theſe kind of *Laudana* ſeem efficacious enough, and elegantly made up, yet the Modern Phyſicians have ſomewhat altered the forms and made the conſiſtence of them liquid, that they may be the better taken in any liquor. To which you may add, that whereas an Opiate Pill (which was no leſs famous for doing hurt than good) was a terrour to ſome People, a Doſe of Liquid Laudanum may be better concealed (if it be neceſſary, and the Patient be averſe to it) and when it is poured into other liquor, may go for a Cordial rather than a ſleeping Medicin. And indeed ſick People ſometimes are too cautious as well as too careleſs in the uſe of Opiates, and therefore, as in one caſe they ought to be admoniſhed, ſo in another they ſhould be cheated and deceived. For the making of liquid as well as ſolid *Laudanum*, you muſt extract the tinctures of Opium and its adjuncts ſeverally, in the ſame manner; which having afterwards mixed all together, and drawn off the menſtruums to the one half, there will remain a Medicin which is of a ſhining red colour, the Doſe whereof is from ℈ß. to ℈j. *Liquid Laudanum.*

Concerning theſe *Laudana* of both kinds, it is of greateſt moment with what menſtruum the Tincture of Opium is extracted; in ſo much that this is grown to be a great controverſie among ſome Chymiſts of no ſmall account, whileſt ſome of them ſuppoſing it to be cold, uſe ſpirit of Wine; and others on the contrary, to abate the heat of the Opium, diſſolve it in ſpirit of Vinegar, or juice of Citron: now indeed *What is the beſt menſtruum to make Laudanum with.*

Phar. Rat. Part I.

each menſtruum is agreeable enough, and one almoſt as good as the other, ſo it be reduced to an Extract; but if you give it in a liquid form, there is no better diſſolver of Opium than ſpirit of Wine, impregnated with ſalt of Tartar volatilized. For this moſt readily diſſolves the maſs thereof, receives a Tincture that ſhines like a Ruby; beſides which, it ſomewhat ſubdues the Narcotick ſulphur, and takes off its noiſome ſmell: for to ſay truth, ſalt of Tartar is the beſt correcter of, or rather Antidote againſt Opium. Hence that ſame Empericks Opiate Pill, in which ſalt of Tartar mingled with Oil of Turpentine is the diſſolver of the Opium, is reckoned very good: to which Compoſition they add Powder of white Hellebore, but not for any other reaſon, I ſuppoſe, than becauſe ſome men maintain a Paradox [a poſition againſt common reaſon] and ſay that Venoms when they are tamed become the beſt Medicins.

The Laudanum of Helmont.

For ſome few Years laſt paſt the uſe of a kind of Liquid Laudanum hath been frequent; of which *Helmont* is commonly ſaid to be the Author. It hath for its menſtruum [or diſſolver] the Juice of Quinces put into a fermentation by the Yiſt of Ale; with which a deep tincture both of Opium and Saffron is extracted, which being ſtrained and aromatized, is drawn off in a Bath to the one half; then part of the remainder is kept for uſe, and is this Liquid Laudanum: of which the Doſe is from 15 to 20 drops. The other part by further Diſtillation, is reduced into the form of Pills, and given from gr. j. to ij. I have given that liquid Opiate, in dyſenterical caſes, oftentimes with great ſucceſs. But my Liquid Laudanum (which I moſt commonly uſe) hath for its menſtruum, the Tincture of ſalt of Tartar raiſed to the higheſt redneſs by long digeſtion: and ſince the Tincture of Opium extracted by this is the ground of the Medicin, for a Complement I add Saffron, Caſtor, Cloves, and Lignum Aloes: of this the Doſe is from 15 to 25 grains.

2. Red Poppy and the Preparations of it.

2. After white Poppy and the opiate Preparations thereof, I come next to tell you of wild or Erratick Poppy, which hath, no queſtion, a kind of hypnotick or ſleepy quality in it, but much more mild and benign than that other; wherefore in ſome caſes it is very ſuitable, and we may be more ſecure in the uſe of it. For this there is a Syrup and a Diſtilled Water prepared, and to be had in Apothecaries ſhops, which are often given with ſucceſs in moſt continued Fevers, and are ſuppoſed to be helpful in the Pleuriſie by a kind of ſpecifick virtue, which they have, becauſe they remove pains, and by ſtopping the Pulſe in ſome meaſure, depreſs or cool the feveriſh boyling of the bloud. Moreover out of the Flowers hereof, infuſed in ſpirit of Wine, you may draw a Tincture, which among Empericks and good Women is a famous Medicin, and ſaid to be good againſt a Surfeit by hard drinking. Of which this ſeems to be the reaſon, becauſe the ſpirit of Wine keeps all that is in the ſtomach from putrifaction, and the Narcotick quality of the Flowers prevents the Fever which is coming upon a man.

3. Having done with the Medicins made of Poppy, Mandragoras, or Mandrake, Henbane, Cynogloſs or Dogs tongue, and Tobacco, come in the rank of Narcoticks, next before us. Of the two former of which, becauſe they are ſcarce ever received into the practice of Phyſick (except the ſeeds of Henbane); I need not make many words, but Cynogloſs, becauſe it breaths, as it were, a ſoporiferous ſmell or flavour, doth openly profeſs its Narcotick nature, and by the beauty of its form, doth as it were, invite us to take it up. For it is a very fine Plant, with ſoft leaves, of a pleaſant green colour, and is crowned with delicate purple flowers. The Powder of the roots thereof is an impediment of, and gives denomination to that ancient and famous Opiate called *Pillulæ de Cynogloſſo.* The Juice of the whole Plant (gathered about the beginning of the Spring) being ſqueezed out and depurated by cloſe and hot digeſtion, and then decanted from the dregs, gives you a clear liquor, which is ſhiningred like a Ruby. This may be uſed either as a Menſtruum to compound other Narcotick Confections, or an Hypnotick [or ſleepy] Syrup is prepared out of it. Or laſtly, being gently evaporated, it is reduced into an Extract, out of which, as out of Opium, Tinctures and Extracts are made with convenient Menſtruums [or Diſſolvers.]

Cynogloſs and its Preparations.

Tobacco.

Tobacco brings up the Rere of Narcotick Medicins, and juſtly claims a place among them. For though it be no ingredient in their Compoſitions, yet the ſmoak of it taken through a Pipe, produces many times the ſame effect as they do. Yea, which is more to be admired, it doth not onely procure ſleep alone, but ſometimes alſo the contrary of it, which is watchfulneſs. I need not trouble my ſelf to tell you the original or uſage of this invention, which is ſo commonly known and practiſed by men and women of all ſexes, ages, and conditions. The reaſon why I put it in the number of Opiates is, becauſe it works almoſt the ſame effect among our Countrymen, as Opium doth among the Turks: for both of them diſpoſe men to do or ſuffer any thing (by affecting the animal ſpirits with a kind of unuſual motion, and rendering them as it were aſtounded) without any great ſenſe of pain or wearineſs. Wherefore

to

to the ſmoak of Tobacco taken in at the mouth, according to the common cuſtom, they aſcribe not onely many, but different, yea contrary virtues and effects, that are repugnant one to another. For it is vulgarly ſaid to heat us when we are cold and chill, and to cool us when we are hot; to procure or prevent ſleeping; and likewiſe to ſatisfie or excite hunger and thirſt: the reaſon of all which, conſiſts in this, that the animal ſpirits being gently agitated, and as it were put into a kind of Dance by this exhilarating fume, are totally deaf to the moleſtations of any troubleſome object; yea, whatſoever of difficulty they have to do or ſuffer, they perform inſenſibly and without any diſturbance. Whereupon the uſe of Tobacco is not onely good, but almoſt neceſſary for Souldiers and Seamen, where it agrees with them, in as much as it makes them both undaunted in all dangers, and able to endure hunger, cold, and labour. But that this ſmoak is very Narcotick and injurious to the ſpirits (before it grows familiar to them by long uſage) is manifeſt from this, becauſe when they firſt attempt to take it, there is hardly any one but ſuffers very great diſturbances in their Brain and Nerves. For when a man is initiated in this dry kind of drinking, he is immediately taken with a ſwimming and a cloudineſs in his Brains, which is often attended with vomiting and purging; their feet fail them, their hands tremble, and their tongue ſtammers, or talks idly. Many times alſo a cold ſweat and terrible fainting fits enſue thereupon, the cauſe of all which is, for that the animal ſpirits, being as it were intoxicated by the Narcotick ſulphur, are in their whole Government very much diſtracted, and forced into diſorders: nor onely at the firſt or ſecond bout, but from the beginning it is many times a long while before the ſmoak of Tobacco can be taken without great confuſion in the ſpirits. But as ſoon as that cuſtom is become uſual and familiar to a man, it likewiſe grows very grateful, and affects the animal ſpirits with ſo much pleaſure, that ſome men had rather abſtain from meat or drink than from the uſe thereof. The reaſon of which is, becauſe this ſmoaking doth gently raiſe, and as it were tickle the animal ſpirits whenever they are dull and ſluggiſh, and puts them into pleaſant expanſive motions, with which they are recruited and refreſhed in a wonderful manner, as after drinking of Wine.

Phar. Rat. Part I.

The effects of ſmoaking it.

And the reaſons of it.

So much for the principal Narcoticks with their Preparations, and the manner of uſing them, who belong all to the family of Vegetables. But leſt it ſhould be thought that Minerals are of no effect in this caſe, ſome men will tell you, that even out of thoſe harder bodies they have prepared moſt excellent Opiates, without any Opium at all in them. *Quercetan* preſcribes the making of a certain *Nepenthe* [Pain-removing Medicin] (which is very efficacious to allay and take off all pains and languiſhings) out of the Narcotick ſulphur of Vitriol, and Oil of Sol and Luna [*i.e.* Gold and Silver] with Tincture of Coral, and other famous Cordials: of which Medicin I am ſo far from admiring the Virtues, that I rather think, that either there are no ſuch metallick ſulphur and Oils at all, or that they are of little or no force. Therefore contemning thoſe things, and returning to the genuine and real Narcoticks, I will for a farewel, ſubjoin ſome forms of them, which I will likewiſe digeſt into ſeveral Claſſes or Orders, according as the Opiates have for their ground either the Syrup or Diſtilled Water of red Poppy, or Diacodium, or Laudanum in an Extract or Liquid, or Pills of Storax or Cynogloſs, or a Philonium.

The grounds of Narcoticks.

1. *Water and Syrup of Rhead Poppy.*

Take of red Poppy Water, and Cowſlip Water, each ℥ vj. *of Syrup of Rhead Poppy* ℥ ij. *of Sal Prunella* ʒ ß. *mingle them and make a Julap. The Doſe is* ℥ iij. *or* iv. *thrice a day, in a Pleuriſie, Pains and Watchings, without any Fever or manifeſt cauſe.*

Take of Poppy Water ℥ iv. *to* vj. *and let it be taken ſometimes by it ſelf twice or thrice a day for the ſame intentions.*

Potions.

Take of Diacodium from ℥ ß. *to* ℥ vj. *of Cowſlip Water* ℥ iij. *of Treacle Water* ℥ iij. *and make a Potion.*

Take of Carduus Water ℥ iij. *of Diacodium* ℥ ß. *of Spirit of Harts horn, from* ℈ ß. *to* ℈ j *and make a draught to provoke ſleep and ſweating.*

Take of Diaſcordium ʒ ß. *of Gaſcoign Powder* ℈ j. *of Diacodium* ʒ ij. *mingle it, and let the Party take it in a ſpoon.*

Take of Diacodium ℥ iij. *of Snail Water* ℥ j. *and mingle them. It is good in a Cough and Pthiſick. The Doſe is one ſpoonful when you go to Bed, and if need be, repeat it after midnight.*

Take

Phar. Rat. Part I.

Take of London *Laudanum* gr. j. *of Powder of Claws compounded* ℈ß. *to* ℈ j. *with a convenient quantity of Syrup of Clove-gilliflowers. Make* 3 *Pills to be taken when you go to Bed.*

2. Laudanum extracted. Pills.

Take of Laudanum gr. j. *of Pilulæ ſtomachicæ cum gummi* ʒß, *make* iv. *Pills, to be taken when you go to Bed, for the Colick.*

A Bolus.

Take of Laudanum gr. j. *to* gr. j. ß. *of Diaſcordium* ℈ j. *make a Bolus. In the room of the Diaſcordium you may put Confection of Alchermes, or of Jacinth.*

A Draught.

Take of Laudanum gr. j. *diſſolved in a ſpoonful of Treacle water, and put to it of Cowſlip water* ʒ ij. *make a draught.*

3. Liquid Laudanum tartarized.

Take of my Liquid Laudanum tartarized xx. *drops, and give it in a ſpoonful of Aqua Mirabilis or Cinamon water, or any other that is fitting. It is good in pains of the Colick, Stone, or Gout.*

Take of Species Hieræ ʒß. *of the ſame Laudanum* xx. *drops, and make* iv. *Pills, to be taken when you go to Bed to purge, and likewiſe to allay pains in the Colick.*

4. Liquid Laudanum prepared with Quinces.

Take of Liquid Laudanum prepared with Quinces, from xv. *ro* xx. *drops, and give it in a ſpoonful of ſmall Cinamon water, in dyſenterical Diſeaſes.*

Take of the Conſerve of red Roſes ʒj. *of Treacle of Andromachus and the Confection of Jacinth, each* ʒij. *of red Pulvis Pannonicus* ʒj. *of Laudanum prepared with Quinces* ʒij. *of Syrup of Coral, a convenient quantity, make a Confection. The Doſe is* ʒj. *every four or five hours, in a very bloudy Dyſentery* [or Flux] *with gripings.*

5. Pills of Storax.

Take of Pil. de Styr. [or *Pill of Storax*] gr. v. *to* vj. *of Lac Sulph.* ℈ß. *of Oil of Aniſe ſeeds* j. *drop, of Balſam of Peru a convenient quantity, make* iv. *Pills to be taken in a Cough, Aſthma, &c.*

And of Cynogloſs.

Take of Pills of Cynogloß gr. vj. *to* viij. *make* 2 *Pills to be taken at bed time for the ſame end.*

6. Philonium.

Take of Philonium Rom. ℈j. *to* ℈ij. *of Conſerve of Clove-gilliflowers* ʒ ß. *mingle them; make a Bolus to be taken when you go to Bed. It is good for the Colick, in a cold temperament.*

After Narcotick remedies, which I have now ſufficiently expoſed to their view, I ſhould in the next place ſay ſomething of Medicins that are meerly Anodynous; that is to ſay, ſuch as gently quiet and compoſe the animal ſpirits when they are any way diſturbed, or in an heat, not by ſubduing or ſtupifying, but onely by mollifying and ſoothing of them. But the *ὅτι* of theſe (*i.e.* whether there are any ſuch in nature or no?) ought firſt to appear, before we form a Diſcourſe of the *διότι* [*i. e.* why they are ſo.] For beſides that Fomentations, Pultiſes, and Ointments outwardly applied, and Clyſters injected into the Guts do ſometimes allay pain, I know no other effect that is performed by thoſe meerly Anodynous Medicins, at leaſt when they are taken in at the mouth. Wherefore I do not think it worth while to frame any reaſons for ſuch, becauſe we cannot at all rely upon them for procuring of ſleep, or eaſing of pain, when it is very ſharp upon us.

Medicins that hinder ſleep.

But ſeeing we have hitherto diſcourſed ſo largely of Opiates, with their Preparations, and the ways how they work, according to the former method, I ſhould now in order ſpeak of ſuch Medicins as are contrary to them, or Anthypnoticks; that is to ſay, ſuch as by keeping ſleep off, when it comes too faſt upon us, make us watchful; if I had not formerly performed this task in almoſt all particulars, in a Diſcourſe concerning the Brain (where I treat of the Lethargy and other ſleepy Diſtempers, with their Remedies) ſo that there is no need for me in this place to repeat the ſame thing over again.

Coffee, and its Effects.

But ſince in that Book, and alſo in other places, I have made frequent mention of a certain liquor called Coffee, which is very effectual for the expelling of drowſineſs, I do not think it altogether improper to add ſeme few words more in this place concerning that Drink with its effects, and the reaſons of its operations, which I have hinted elſewhere. It would be beſides our purpoſe here to diſcourſe of the ancient and common uſe of it, now among the Turks, and formerly among the Arabians and other Eaſtern Nations; but ſeeing that this Drink hath been uſed even by our Country-men too, for ſome years laſt paſt, and almoſt every body knows by experience what great virtue it hath in driving away drowſineſs, therefore let us now inquire into the reaſons

The reaſon of it.

of this ſo well known and tried effect. The reaſon of this I have told you in the

Chapter

Chapter *De Pervigilio* [of Watching] consists in this, that the Coffee insinuates adust particles (wherewith you may know by smelling as well as tasting, that it abounds) immediately into the bloud, and then into the nervous juice; which particles do by their disagreeableness, and also by their restlessness, not onely keep the pores of the outward Brain still open, but likewise give such spurrs and provocations to the spirits, (which are disengaged for all bonds of drowsiness besides) as may excite them still to perform their offices: for to procure sleep these two things are necessarily required, of which sometimes the one and sometimes the other is most effectual: that is to say, all the pores and passages of the outward Brain or the Cortex of it, must be very much stuffed and filled with a Liquor that distills as it were from the bloud, and flows into those parts, and by that means be closed up; and then afterward to produce that effect, it is necessary that the animal spirits being excluded out of those pores and passages, and also many times clogged with nutritive and serous particles, should betake themselves towards the middle of the Brain and lie idle. In these Preparatives to sleeping, there is not always one and the same order. For sometimes the animal spirits do first and of their own accord forsake those places, whilest the nervous juice immediately runs into them when they are emptied; and sometimes the nervous humour that flows thither with the serum in great plenty, gets into those passages first, driving the spirits out of them even against their inclinations, and forcing them inward. *Phar. Rat:* Part I.

But the operation of Coffee seems contrary to both these effects: For immediately after the drinking of it, the adust particles, which are extraordinary active and nimble, being conveyed into the bloud, do somewhat dissolve the liquor of it, and separate the serous part toward the reins and into the habit of the body; and then those particles coming to the Brain, do very easily open the pores of it, and keep them also by their restlessness very wide. Afterward being joined to the spirits, they strip them of all other particles that either oppress or are nutritive, and consequently put them, being now light and volatile, into several motions, and cause them to be expanded through the whole circuit of the Brain, which is freed from all oppletion [fulness] and obstruction.

Its conveniences and inconveniences.

But in the mean while, when the spirits being exercised in this manner continually and indefatigably, are deprived of the access and assimilation of the nervous juice, their forces are not sufficiently and in the usual manner recruited. Indeed the old Spirits are made more active and nimble, but the supplies of new ones are diminished. So that it appears from hence, that this drink though very common in use, and in some cases very beneficial, and extraordinary physical, yet in some others perhaps is noxious or less wholsome. And that it is so, not onely reason but daily and common observation tells us, in as much as Coffee-drinkers, that take it to excess, become many times lean Fellows, and subject to the Palsie as also averse to, or unfit for Venery. The former effect is so frequent and well known, that I have for that reason alone forbidden a great many to drink Coffee, because it makes them grow lean.

It makes People lean, and Paralytick, &c.

For seeing the bloud, by the daily and too frequent use thereof, becomes sharp and more heated or dried, it is therefore less able to nourish. But as to the indispositions of the Brain and Nerves, I think I sometimes prescribe this Drink, for the curing of them, as much as any man: for I use to send some of my Patients to the Coffee-houses rather than to the Apothecaries shops.

Indeed in most diseases and maladies of the Head, as the Head-ach, Swimming, Lethargy, Catarrhs, and the like, where there is a moist Brain, but a dullness and numness of the animal spirits, joined with a full habit of Body, a cold or not an hot constitution and watery bloud, Coffee is taken many times with great success: for being daily drank, it wonderfully clarifies and illustrates or purges the Brain, and dispels all the clouds from off every function whatsoever: but on the contrary, such People as are thin, cholerick, or melancholick, and have sharp and hot bloud, an hot brain, and their animal spirits too much disturbed and discomposed, ought altogether to abstain from this kind of Liquor; because it the more perverts both the spirits and humours, rendering them unfit and unable for any functions whatsoever. For I have observed many People that have had no great plenty of spirits, and likewise such as were subject to the Headach, Swimming in the Brains, Palpitation of the Heart, and trembling or numbness in the limbs, that have immediately been the worse for drinking of Coffee, in those respects, and have thereupon presently felt an unusual languishing in their whole Body.

THE END.

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FINIS.

PHARMACEUTICE RATIONALIS:

OR, THE

OPERATIONS OF MEDICINES IN Humane Bodies.

The Second Part.

With Copper Plates describing the several Parts treated of in this Volume.

By *THO. WILLIS*, M.D. and *Sedley* Professor in the University of *OXFORD.*

LONDON,

Printed for *Thomas Dring*, *Charles Harper*, Booksellers in *Fleet-street*, and *John Leigh* at *Stationers*-Hall, 1684.

THE PREFACE TO THE READER.

SInce first I began to consider the Operations of Medicines in humane Bodies, and their manner of working, and for some time meditating upon the entire Subject, at length published an Essay of the Rational Curatory part; I became affected with so vehement a desire of farther prosecuting that Speculation, that in all spare hours, (to wit, as frequently as I might be vacant from my practice) I could hardly intend or admit thoughts of any other thing: And that not so much that I might please others, as by often turning in my mind, and writing my Meditations of this Subject, I might be better instructed to prescribe to my Patients. For certainly the not duely weighing the Reasons by which Medicines operate, renders all Physick to be Empirical, and to be governed rather by Chance or Fortune than by Advice; and it frequently comes to pass, that a Medicine rashly administred, is but casting a Die for a Mans life. Wherefore, that I might satisfie my self, and practise Physick (as is usually said) with a safe Conscience, it pleased me to bestow more labour in the search of the true Reasons of physical Energies and Efficacies. And because in this Treatise, we chiefly consider Medicines, respecting certain private parts or Regions of the body, and their proper Diseases, therefore we have endeavoured in the first place to perform these three things; *viz.* First that a most accurate Anatomical Description might be given of the parts, (if not already extant) whose Distempers and Remedies are treated of, as to the Fabrick and uses of all their Vessels. Wherefore, turning over the Breast and Lungs, and most diligently viewing their inward recesses and apartments, what thing soever observable either the Ancients or Moderns have published about these, and whatsoever further by Knife or Microscope we have detected, we have here set forth. In which task, as formerly in some others of the same nature more exactly done, I must confess I owe much to the sedulous labour of my most learned Friend Dr. *Edmund King*, and

to his most dexterous Dissections. And really I esteem it so necessary to lay the History of the Parts, as a foundation to our Rational Curatory Method, that without it I did believe the whole Superstructure would be meerly phantastical and altogether unstable, or at least unprofitable. For surely, either to practise Physick, or demonstrate its Operations on humane Bodies, without an exact knowledge of the parts and passages, on which, and by which they work, would seem equally absurd, as if a Philosopher ignorant of Mechanical affairs, should go about to unfold and explicate the Artifice and cunning Workmanship of a Clock moving of it self, according to the Theory of Natural Motion delivered by *Aristotle*. Wherefore we have view'd with most exact diligence, in the first place, the Subjects of Physick, or the places of Operation in our Bodies, as the Circuit in which we are to move. Then secondly we have not been less solicitous, that according to the Phænomena of all parts lately detected by Anatomical observation, the true and real Hypotheses of Diseases should be built, whereof we have designed the Remedies; that not still persisting in the thread-bare paths of Ancient Physick, by a certain blind and implicite obsequiousness, after the manner of Beasts, according to the proverb, to be only guided by our Ancestors footsteps; but deriving the Causes and formal Reasons of Diseases from their very Springs, we every where endeavour to shew, from what Disposition of Blood and Humours, from what affection of Animal Spirits, from what habitude of Fibres, and of other solid parts, every Disease proceeds. And these things so premised, and laid instead of a solid Foundation, at length in the third place, that the structure of our Curatory method being rightly compacted, may happily rise up and firmly consist, we have gathered together most of the Medicines respecting most of the private parts and regions of the body, and the peculiar Distempers thereof, *viz.* both Simple and Compound, both Old and New, both Dogmatical and Empirical, gathered out of the Physick-books of every Age, as also those chiefly celebrated by Quacks and Nurses; more choice forms of all which, or at the least the chief of them and manner of using, we have aptly assign'd, and annex'd the reasons as to the Preparations, as also the Operations and Effects of them. But that all is not comprehended in this Tract that was omitted in the former, which yet I had hoped might have been, happens from the plenty of matter, and the bulk of the work encreasing upon our hands: For assuredly, it is more than the task of one Man or Generation, to exhibit a compleat Curatory Method, and absolute in all points. For if this Disquisition were more fully instituted as to its Latitude, not only all the *Ma-*

teria

teria Medica (which is almoſt infinite) but alſo the whole Body of Phyſick offers it ſelf. Wherefore theſe our Attempts court not the name of Treatiſes, but of Eſſays. Truly it will not be needful for many Phyſicians, eſpecially thoſe who neglect the Phænomena of Nature, being intent only on their Practice and Gain, to be learned about the Reaſons of all Remedies: but to the genuine Sons of Art, this will be of value, if not to direct, at leaſt to incite them to the Knowledge and ſerious weighing always of thoſe things they take in hand. And if theſe ſmall endeavours ſhall inſtigate others better to poliſh that Study, whatſoever Reviling I may reap from the malevolent and envious, it ſhall never repent me of my labour. For when I ſhall be well conſcious to my ſelf, that I have not ſuffered my Faculties although ſmall (as the Talent entruſted with me by God Almighty) to periſh through ſloth, nor ſuffered them to be buryed in the earth, but that they may be rendred with ſome Intereſt beſide the Principal, it will much pleaſe me, nay, I ſhall ſeriouſly rejoyce and triumph.

POST-

POSTSCRIPT.

WHile these were Printing, the most sad message arrives, that the Author, most worthy of Immortality, oppressed by the irresistible assault of a Pleurisie, is departed from among the Living; neither did the Arts profit their Master, which did all others. The Reader will pardon us, if we for a little space celebrate the Funeral of so Sacred a Memory, nor esteem it superfluous to bear in a few words, what manner of person he was who wrote such things: yea he will rejoyce to understand that he was equally Good as Learned, that he also exercised himself in the Practice of Piety, who was most conversant in that in Physick.

The matter requires a just Commentary, but we shall briefly propound what at first came into our sudden thought, while our mind was surprized with so unexpected an Accident.

Extracted from an honest Family, he had a Father educated in ingenuous Studies, who after he had gone Master of Arts in the University of Oxford, *being taken with the retiredness of the Countrey, repaired to a Possession he had near the same City, and solely attended his Domestick Affairs, and maintenance of his Family: being enough deserving of the World, who begat such a Son. But He, the Civil War raging, being snatcht away by the Contagion of a Camp-Feaver, left his Son an Orphan, near about twenty years of age, placing the first Rudiments of his Studies in* Christ-Church; *who being called to take on him the care of an Inheritance, for some time remained in the Countrey, but harrased by the Incursions of the Rebels, who were possessed of a Garrison strong enough Five miles from thence, and every where Plundering, he betook himself again to* Oxford, *being the Tents of the King as well as the Muses; where listing himself a Souldier in the University Legions, he received Pay for some years; until the Cause of the Best Prince being overcome,* Cromwell's *Tyranny afforded to this wretched Nation a Peace more cruel than any War. From thence, the Church being trampled on, and Divinity together with Divines suppressed, he applyed himself to the study of Physick, in which, in a short time he made eminent progress. In the mean time being nevertheless addicted to the study of Piety, (whereof it was a considerable demonstration, that when the Liturgy of the Church of* England *was thrust out of the Church, and none could be present scot-free at those holy Offices after the ancient manner) he entertained Religion then a Fugitive; and allotting part of his House for Holy uses, brought it so to pass, that Assemblies, and Publick Prayers, and other Offices of Piety were constantly performed according to the Rites of the Church of* England. *In the mean time he writ and published those most excellent Tracts by which he first became known to the World,* viz. *Of* Fermentation, *of* Feavers, and of Urines.

At

At length the King restored, and access opened to University Degrees and publick Employs, he proceeded Doctor, and was publickly declared Professor of Natural Philosophy, which Profession he did adorn with the highest praise; Moreover, his Anatomy of the Brain, *and his Treatise of the* Scurvy, *and of* Convulsions, *were published.*

But about the Year 1667. being called to London *to practise Physick, it is incredible to relate, how soon, and with how great Commendations he grew famous, especially being so composed by Nature and Custom, that he could not recommend himself by words composed to deceive, or the cunning Arts of Mountebanks. But though he spent whole days and nights in care of the Sick, he was yet at leisure to adorn his Art by composing Books, from whence among a thousand Interruptions he published these Treatises, of the* Accension of the Blood, *and of* Muscular Motion, *of the* Soul of Brutes, *of the* Diseases of the Brain, *and the first part of his* Pharmaceutice Rationalis, *and at length the* other *which we now present. All which, with the Author's Animadversions, and writings unpublished, being collected into one Volume, and committed to the care of the most faithful Apothecary Mr.* J. Hemming, *we hope some time to print here.*

Moreover, the same care for Divine Worship was still impressed on this most Pious Soul; and since he could not be present, by reason of Employ, at the Canonical Hours at the Publick Devotion in the Parish Church where he dwelt, he procured the Sacred Offices of the Church to be there celebrated early in the Morning and late in the Evening, and for the most part was constant at them, whatever Business was repugnant. And seeing this Institution profitable to many in the Neighbourhood, who were likewise all day detained about Commerce and Trades, he endowed a Priest with a fit Salary at his Death, to discharge that Function for ever.

But small was this proof of his excellent Pious temper. Although no Person more frugal and attentive to his employ, yet none more munificent, denying all things to himself, yet denying nothing to the Poor and helpless. Besides what bestowed with his own hands, he provided Almsgivers and Dispensers of his Charity every where in the City, Countrey, and in the University. I speak what I know by frequent experiment; one might easier have received from him, for a fit object of Charity, an hundred Crowns, than have extorted as many farthings from most others. And though any one might justly impute the large Revenues he acquired, to his indefatigable Diligence and constant Frugality, yet I believe it rather to proceed from his bountiful Largesses. and the Divine benediction thereon. From the beginning of his Youth to the last period of his life, he was Master of no summ of Money which he accounted his own, until he had consecrated some considerable Portion of it to God and the Poor: and when a few days before his last, which I must ever lament, we conferr'd together, (as if he had foreknown his approaching Death, and being more solicitous about the Poor than his own Off-spring,) he diligently advised about stating these Accompts.

Postscript.

I omit here to decipher, how undisturbed he was in Adversity, and how temperate in Prosperity; how modest in the highest Fame for his Learning; when unworthily provok'd, how prone to forgive Injuries; how faithful to his Prince to his death; how obedient to the oppressed Church; how candid and ingenuous in the Profession of his Art; how indefatigable his Studies, how sparing in his Speech, and how much a Christian in the whole state of his Life. To finish all which according to his deserts, is not the work of one hour or Paragraph. In short, he was constantly exercised in Prayers, Studies, Labours, Almes, and Watchings; at length being near Fifty seven years of Age, in the beginning of November *he seemed troubled with a Cough (now the Epidemical Disease of the time) which (while it was thought light and inconsiderable) suddenly passed into a Pleurisie and Peripneumonia. And when this most expert Person was not relieved by frequent Bleeding and diligent taking of Remedies, himself perceived the Period of his Life to approach, (his Friends hoping better;) and after three days his Houshold affairs being settled, and having taken the* Viaticum *of the* Holy Eucharist, *and being received into the Peace of the Church, he commended his pious Soul to God, having his senses entire to the last breath, and finisht his most exemplary Life with the like Death.*

THE

THE SECOND PART OF *PHARMACEUTICE RATIONALIS*, OR OF THE OPERATIONS OF MEDICINES IN HUMANE BODIES.

SECT. I.

Of the Medicines of the Thorax.

CHAP. I.

Of the Organs of Breathing and their Uſe.

IN the former Treatiſe having eſſayed to explain the reaſons of every Medicine, for the moſt part we have toucht only upon general Medicines, namely which excite ſome Evacuation, or recreate and reſtore the fainting Spirits, or calm thoſe which are too much raging and unquiet: But moreover there are many other Remedies, and thoſe of ſeveral ſorts, which are ſuppoſed to have reſpect to ſome peculiar part of the Body, or ſome particular Diſeaſe, and to be appropriated to thoſe ends by a certain kind of ſpecific virtue or operation. Now as concerning both the ὅτι and διότι of theſe, at leaſt the chief of them, *viz.* whether it be really ſo, and for what reaſon it comes to paſs to be ſo, it ſeems now worthy to be inquired into: And firſt of all we will treat of the Medicines of the *Thorax*, *viz.* thoſe that are wont to be preſcribed againſt the Cough, Phthiſic, Catarrh, Aſthma, Dyſpnœa, and other Diſeaſes of the Breaſt. *The Authors purpoſe in the preſent work.*

But ſince the reaſons as well of theſe Diſeaſes as of medicinal Operations in healing them ſeem very abſtruſe and moſt difficult to declare: therefore before I enter upon this task, ſomething ought to be premiſed about the parts themſelves, as well touching their uſes and ordinary actions, as their ſickneſſes or preternatural affects. As to the firſt, the parts of the *Thorax* are either principal, as the Heart and Lungs, with the Veſſels appendent unto them; or ſubſervient, as the membranes and Muſcles, with the Diaphragma; as likewiſe the Ribs, with the Vertebra's; then Pneumonic Veſſels, with the nervous Fibres and Glandules. The conſideration of the Heart and its Veſſels doth not properly belong to this place, becauſe not ſo much the ſickneſſes of the Breaſt alone as the general ſickneſſes of the whole body are uſually reckoned amongſt its paſſions. Whereas therefore the remedies appointed to cure the diſeaſes of that region, have ſpecial reſpect to the Lungs, and to the other *The parts of the Thorax.*

PHAR. Part. II.

Organs of breathing ſerving them; therefore. firſt we will deſcribe the fabrick and uſe of theſe parts, then their diſeaſes afterwards, together with the method of cure and remedies; and laſtly endeavour to add the reaſons of all theſe.

The ſubſtance of the Lungs altogether membranous.

The ſubſtance of the Lungs was always accounted by the Ancients, and moſtly hitherto by modern Authors for fleſh and a Parenchyma, like the frame of the other bowels; which notwithſtanding was accounted lighter and ſpongeous (for as much as it was apt to be diſtended much by air pufft in, and to float upon waters.) Moreover, whereas the Lungs taken out of an Embryo look red, and ſink in water; and the Lungs of ſome grown perſons being boiled, appear compact enough and more ſolid; almoſt no man doubted but they conſiſted really of fleſh: until lately the renowned *Malpighius*, a moſt diligent Searcher of Nature, found thoſe parts to be altogether excarneous, and meerly membranous; "and therefore he judges the bulk of "the Lungs, if the Nerves and certain Veſſels be ſeparated with the branches of the "*Trachea*, to be a certain heap of little Bladders, and thoſe ſmall Bladders every "where ſtretched out and ſinuous, to obtain ſuch poſition and knitting together, "that an entrance lies open into them from the *Aſpera Arteria*, and ſo from one "into another, until at length they all end in the Membrane incloſing the Lungs. "And truly that it is ſo, he makes clear to ſenſe by an Experiment. For let a Lung "be taken out hot, and let water be ſo often caſt by a Syringe into the Pneumatic Ar"tery, as till the whole frame appear ſomewhat white, and almoſt tranſparent, the "blood being clean waſhed out; afterward this water being ſqueezed out by preſ"ſing, and the air let in by the Wind-pipe, and pen'd in, let the Lung ſo filled be "dryed: and it does not only, whilſt expoſed to the light, outwardly ſhew tranſpa"rent little Bladders; but being inwardly cut, it preſents a white heap of little "Bladders to the eyes. Beſides, having viewed it with a Microſcope, he diſcovered a certain wonderful Net, binding and knitting together every one of thoſe little Bladders; which Net conſiſts of the minute productions and branchings of the Artery and Vein; which Veſſels circulate the blood by the ſmall and crooked paſſages, and by the many turnings of the Pipes.

Conſiſting of almoſt infinite Lobes.

The moſt renowned man hath found out beſide theſe little Bladders for the moſt part conſtituting the frame of the Lungs, a new and more admirable furniture of this Bowel, *viz.* he ſhews plainly the bulk of the Lungs to be blown up by almoſt infinite Lobes girt about with their proper Membrane, which being endued with common Veſſels, grow to the ſmall twigs of the *Aſpera Arteria*: the inſertion and ſituation of which kind of little Lobes are manifold, as being ſometimes affixt to the Baſis of the *Trachea*, ſometimes to the Ribs, or to its Cone; alſo according as they end in the outward and plain ſuperficies, or in the corners of the Lungs; and according as they ought to have a due poſition, knitting and inter-ſpaces among themſelves, rightly to fill up the frame of the Lungs. The little Lobes out of which each Lobe of the Lungs is made up, in the third Table are accurately and to the life expreſſed.

Their little branchings.

Certain inter-ſpaces diſtinguiſh theſe little Lobes (which manifeſtly appear in a larger Lung or in any other half boiled) which (as the renowned Perſon hath obſerved) are not bare cavities or empty ſpaces, but they have many Membranes ſpreading from the little Lobes, ſome parallel, ſome angular, and are alſo covered with many Veſſels, ſo as theſe inter-ſpaces are certain membranous little bladders, yet tranſparent and moſt thin. If you lightly open in one ſingle Lobe of the Lung one of theſe inter-ſpaces with the point of a knife, and ſhall blow into it by a ſmall hole through a Pipe, preſently that whole Lobe will be very much extended, every interſpace being pufft up; and then if you bring this frame to the light, the interſpaces being made tranſparent, do ſever by great intervals every Lobe very conſpicuous; and ſo every rank of the Lobes will appear like a Poly pody-leaf, and under the ſame figures, as *Malpighius* hath deſcribed, and are repreſented in Fig. 2. of our third Table. But when the little Lobes are filled and extended by liquor eaſily congealing caſt into the paſſages of the *Trachea*, the appearance thereof is ſomewhat diverſe, and ſeems in the form of Grapes, as is expreſſed in Fig. 1. of the ſame Table. The Veins and Arteries every where accompany this production of the *Aſpera Arteria*, and extend themſelves through the whole ſubſtance of the Lungs by a certain knitting and alike branching. This is plainly perceived by a pleaſant ſight, in a Lobe of the Lungs being emptied and turgid, Quick-ſilver being caſt into ſome of the Veſſels, and others filled with a coloured liquor. But in diſſecting the living, another ſort of Veſſels, *viz.* Lymphæducts are manifeſt to the eye to be ſpread through the whole Lungs: and we have in another place clearly enough ſhewn, both very many Nerves and nervous ſlips every where to be diſtributed through them. Beſides theſe parts, and the

The Lymphæducts and nervous ſlips.

primary

primary or chief veſſels of a Lung, ſome others, and thoſe as it were ſecondary, are to be obſerved. For the Pneumonic Veins and Arteries are endued with other ſanguiferous Veſſels ſpringing from the *Aorta*, moreover with Glandules, and likewiſe with Fibres as well nervous as moving; and the Wind-pipe is endowed with every one of theſe, and cartilaginous ones beſides.

The Veſſels of a Lung.

Whence we may infer, that the entire frame of a Lung is meerly fiſtulous, and compacted of Pipes of ſeveral kinds and magnitude, and variouſly and moſt intricately diſpoſed: which although they may appear wonderfully complicated, and many ways twiſted and wreathed, are yet every where continuous, and being ſtretched out with a mutual reſpect to one another, do hither and thither in good order and regularly convey and diſpoſe the air, the blood, the *Lympha*, and animal Spirits for ſome acceſſary uſes. To deſcribe as it were with a Pencil this bulk of a Lung, together with the branchings, ſeparatings, and mutual complications of all its Veſſels, would be no leſs difficult a task than to trace the ſeveral threads of a harl of ſilk, and their reſpect one to another. Nevertheleſs, that both the Pathology of the *Thorax*, and the cure, may be duly known according to our deſign, it ſeems to be material to recite here all the Veſſels of the Lungs one after another, and to deliver as well their deſcriptions, as their preternatural uſes and diſeaſes, to which at length the Therapeutic Method ſhall be ſubjoyned. And theſe are the Veſſels of which the entire fabrick of the Lungs conſiſts, the Wind-pipe, with the *Bronchia* and little Bladders, Arteries, Veins, Lymphæducts, and Nerves, to which may the parts and appendices of thoſe Veſſels be added, *viz.* the Coats of the greater Veſſels, which are endued with other ſanguiferous Veſſels and Glandules, and alſo with nervous Muſcles and Fibres.

Wait on the Trachea.

Therefore as to the chief Veſſels of the Lungs, although all theſe, by reaſon of their mutual offices, communicate among themſelves with a wonderful affinity; yet the Arteries and Pneumonick Veins attend on the *Trachea* and its partitions the moſt exactly; for the branches and ſprigs of every one of theſe ſpringing alike from their reſpective ſtocks, and ſtretcht out to and fro, go on every where with like pace; ſo that the *Trachea* and its branches are always in the middle, above that the Vein, and beneath the Pneumonick Artery are carried, and all are diſtributed with an equal and ſociable branching: and the ſprigs and branches, ſent from each of them, are preſently applied to their like, and are interwoven like wonderful Nets, of which the texture of the Lungs is almoſt totally conſtituted. It will be impoſſible to deſcribe the ſpreadings out and various complications among themſelves of all theſe going on together, as to the leſſer ſprigs and ſlips; yet if you will caſt into every veſſel apart Quick-ſilver, hot and flowing Gypſum, Wax mingled and made liquid with Oyl of Turpentine, or ſome ſuch matter, which will extend all or the chief paſſages, and continue them ſtufft, then you may exactly enough repreſent the figure: and after that manner the frame or texture of the whole Lung may be conceived, each being deſcribed by it ſelf and apart. Wherefore upon theſe and all other Veſſels and parts of the Lungs we will treat in order; and firſt of the *Trachea* or Wind-pipe.

The deſcription of the Trachea.

The Wind-pipe or *Aſpera Arteria* is a Pipe ſomewhat long, conſiſting of Griſles and Membranes, which beginning from the Throat or loweſt part of the Jaws, and leaning on the Gullet, and deſcending into the Lungs, is diſperſed by manifold little branchings through their whole frame. It is divided into two parts by the Ancients, *viz.* the upper, which is called the *Larynx*, and the nether commonly called *Bronchus*; to which a third or loweſt is added, by *Malpighius* called *Veſicularis*, or the bladdery one.

The deſcription of the Larynx.

The former of theſe, which is the beginning of the *Aſpera Arteria*, doth chiefly ſerve for vociferation or loud noiſe, formed of many and various Griſles, to which alſo are joyned proper Muſcles; the deſcription and uſe of all which are ſo exactly delivered by Anatomiſts, that there is no need of dwelling longer on the deſcription: we only advertiſe for methods ſake and by way of abridgment, that the Larynx contains ſome greater Cartilages of divers forms, and ſome uniform; the former, by reaſon of reſemblance, bear the denomination of *Epiglottis*, the Buckler-like Cartilage the Ring-Griſle, and ἀρυταινοειδὴς. To this laſt doth ſucceed a continual rank or row of Cartilages, faſhioned altogether after the ſame figure and manner; every one of which, whereas they reſemble a circle, but not compleat, are diſpoſed after ſuch a ſort, as if one ſo compoſe many wooden Rings, that there ſhould grow up from the ſides of them, by laying a good many one upon another, a certain Pipe as it were with Ribs. Theſe circular Cartilages are equally diſtant one from another in their whole paſſage, and are knit together by the benefit of an inner Membrane (which fills up the ſpaces between like the *Perioſtium*) as with a ligament. But the hinder part of every Ring-like Griſle where it lies upon the Gullet, that it may ſerve

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better to the ſwallowing of meats, turns into a Membrane, which altogether is the ſame, and binding together thoſe cartilaginous rings, and covering the whole hollowneſs of the *Larynx*, is always moiſt with an unctuous humour, by which it may as well be defended againſt the ſucking in of ſharper air, as breathing out more acrimonious vapours.

Membranes encompaſſing the wind-pipe.

Beſides this inner Membrane, alſo another outward, though thinner, encompaſſes the whole Wind-pipe, by the aid whereof both the Cartilages are more firmly knit among themſelves, and the whole Pipe bound to its neighbouring parts, and deſcends more ſafely and ſtrongly into the Breaſt. Beſides, we judge there are ſome other uſes and offices of either Membrane, than that it only ſerve to faſhion or defend the ſides of the Wind-pipe: for as much as we do here manifeſtly obſerve many Nerves and nervous ſtrings every where inſerted, and alſo the more inward Coat of the *Aſpera Arteria* to be endued with Fibres, as well nervous as fleſhy or muſculous: from whence we may conclude the Wind-pipe to injoy both a certain ſenſe and motion either in the whole, or at leaſt in ſome parts. And truly it is manifeſt even to common obſervation, that its more inward paſſage doth excel with a moſt acute ſenſe; for as much as it is ſo much provoked by the ſmalleſt prejudice, that preſently it is wonderfully forced into a convulſive motion, *viz.* a Cough: but as a ſenſe of annoyance, and from thence very often an inſtinct of motion ariſes from this Veſſel; ſo we think that its Fibres do after a ſort move of themſelves both in breathing and coughing. Surely in reſpect of this it is not to be doubted, becauſe in this inner Membrane we find two orders of muſcular Fibres in that faſhion diſpoſed as in the *Aorta* and Inteſtines: to wit, there is one upper order of ſtraight Fibres, which while they are contracted, make all the circular Cartilages to be drawn together nearer to one another, and for that cauſe to abbreviate the Trunk of this Veſſel according to all its parts ſucceſſively. Under this lies another order of circular Fibres, which (while they are pufft up) being contracted, the hollowneſs of the Wind-pipe is much narrowed. Therefore when the moving Fibres of either kind make the paſſage to be ſtraitned according to all its dimenſions, it is obvious enough that they conduce to the diſcharge of the function of breathing, and more or leſs to be active, as there is endeavour to breath quicker or ſlower, more intenſly or more remiſs. Theſe Fibres being more vehemently contracted in a Cough, in hawking, in blowing out, and certain other more ſtrong exerciſes of expiration, do force the breath and other contents of the *Aſpera Arteria* to be violently expelled. Moreover from this action ſometimes either depraved or hindred, it ſhall be declared hereafter how an Aſthma, a Dyſpnœa, and ſome other diſeaſes about breathing do ariſe.

The glandulous and vaſculous Coats.

This inner muſculous Coat hath alſo two others, as if growing thereunto, to wit, one glandulous, and that full of veſſels. For as in another place we have remarked about the Anatomy of the ſanguiferous Artery, one may alſo here take notice, that the inward Pipe of the Weazand is covered with a moſt thick weaving of Veſſels of every kind, and eſpecially of thoſe carrying blood, in faſhion of a Net. The Arteries not ſpringing from the Pneumonic Veſſels, but from the Bronchial branch (which the moſt renowned Mr. *Ruiſch* diſcovered to have its riſe from the *Aorta*) are inſerted into this ſame; which the veiny ſlips do accompany, owing their origine to the *Vena cava*. The nervous ſprigs meeting theſe two, are variouſly folded; and ſo of all weaved together, is framed as it were a little Net, covering the whole back of the Weazand, under which folding of Veſſels very ſmall and whitiſh Glandules are every where ſtrewed, or rather cleave to them; juſt in the like manner, as we have in another place ſhewn to be in moſt other greater Veſſels, and in all membranous Bowels: on all which the Lymphæducts adjoyned do wait. As to the uſe of theſe, without doubt the Arteries and Veins waſh through the Pipe of the Weazand with bloody ſtream for its nouriſhment; and the Nerves carry plenty of Spirits, and the faculty of performing motions to the muſcular Fibres. Afterwards whatſoever of ſuperfluous moiſture be left by the Arteries, that the Veins cannot bring back, the Glandules do receive and retain, until it may be ſent back to the maſs of blood through the Lymphæducts. When they are too much filled, by reaſon of the Lympha more plentifully left, a humour diſtilling from the Glandules as well as from the Arteries into the hollowneſs of the Wind-pipe brings a Catarrh. All the Coats of the *Aſpera Arteria* diſtinct and ſeparated from each other are expreſſed in the ſeventh Table.

Of the Bronchia.

The ſecond part of the Wind-pipe, commonly called *Bronchos*, begins from the entrance of the Lungs: for near the fourth Vertebra of the Cheſt that great Pipe deſcending, is divided into Two Trunks, one whereof goes towards the right ſide of the Lungs, the other the left: afterwards both having entred the Lungs, and being ſubdivided for the greater Lobes, diſtribute very many ſprigs (as for the moſt part in the

the gills of fishes) to the Lobes or lesser Lobes through the whole frame of the Lungs. The passages of all these are furnished, even as in the Larynx, with Cartilages, but framed something in a differing manner: for in the *Bronchia* these are not Ring-like, but resembling a Coat of Male, so that when there is need to contract those passages, the inferiour Cartilage goes under the hollowness of the upper, almost in the same manner as it is in the joynts of the shelly Coat of a Lobster. Provision is so made by the work of God, that when the Lungs are dilated, the *Bronchia* are stretcht out into the greatest length; and when they are contracted, the *Bronchia* are abbreviated, one part being drawn into another.

Their Systole and Diastole.

The Coats of the *Bronchia*, as also of the Larynx, have muscular Fibres of both kinds, together with the Glandules and the Net-like twisting of Vessels: from whence we may also conclude, that all the lesser Pipes of the *Aspera Arteria* have their constant turns of Systole and Diastole, *viz.* all the Pipes are contracted while we breath out, and relaxed while we suck in air: moreover from the same Glandules and little Net of Vessels every where continued almost within every inward recess of the Lungs, doth distil the Catarrh humour. A certain Bronchial branch of the *Trachea* belonging to each Lobe of the Lungs is described in the second Table *H. H.*

The Lobes of the Bronchia.

And the branched *Bronchia* of both sides not only constitute two or more greater Lobes; but as *Malpighius* hath observed, many lesser or little Lobes distinct among themselves; for each Bronchial branch sends forth to and fro many little branches or twigs, every of which twigs being joined with alike twigs of the Pneumonic Artery and Vein, from thence are parted into innumerable lesser sprigs; all which being every where followed and complicated among themselves, and having got Nerves and peculiar Lymphæducts, and ending in the outward superficies of the Lungs represent as it were a certain private Grove; and so the whole structure of the Lungs consists of many little branches of the aforesaid Vessels complicated, as it were of so many several Groves. The branches whereof and outmost sides of which, although they may seem mutually to touch themselves and cleave together, yet they are disjoyned one from the other, and are every one bounded within their proper limits; far otherwise than the productions and communications of Vessels are in the Brain, where the Arteries and Veins rising up in its several Corners, extend on every side, and creeping through its whole space, and mutually inosculating, do all communicate among themselves.

Their little branchings disjoyned from one the other.

The use of the aforesaid frame.

That former fashioning of the Vessels hath been very necessary to the uses of the Lungs; for seeing the air ought only to enter the Lungs for that end, that it might pour out to the blood nitrous particles for its flame and vitality or life, and presently return back; and seeing the blood doth pass through the Lungs for that cause, that it might meet the air suckt in according to all its parts; therefore it behoves that both these, *viz.* the air and the blood be divided into small portions, and with these make every where distinct and short meetings. The manner of this is most elegantly perceived in the gills of fishes; for seeing the *Bronchia* are as so many greater Lobes, every one of these is divided into many rundles, furnished with a complication of every kind of Vessels, as if it were into so many Lobes; in every one of which the blood is drawn out by minute portions, as it were little rivulets, that it might throughly meet with the nitrous particles, and afterwards return into its chanel.

The uses of the little bladdery Cells.

The bronchial Pipes lead into the utter cavities, *viz.* into the numerous little Bladders discovered by *Malpighius*; which truly are certain continued parts of the *Aspera Arteria*, but distinct from the former, because the Grisles are wholly wanting to them, and, which supply the turn of these, are distant one from another in larger spaces: for all the Bronchial branches send forth lesser slips from themselves every way; whose passages, although void of Grisles, notwithstanding are straitned as it were with certain ligaments at certain intervals; and the spaces between these being filled with air suckt in do make partly those small bladdery little Cells. In truth those passages may not unaptly be compared to the Gut Colon of a Mouse, whose continued hollowness in as much as it is girt about in divers places, seems to be divided as it were into many little purses. Moreover those bladdery passages being shorter on either side the *Sinus* or hollowness, have as it were particular little Bladders growing thick to them, and therefore the heap of all the Cells seems not much unlike to a bunch of Grapes. The Figures of these as much as may be are exactly represented in the third Table. Those little bladdery Cells, that they may put forth their contracting endeavours for breathing, have muscular Fibres, as is plainly seen by the Microscope. For as much as great plenty of air ought to be drawn within the Lungs, and reserved in part lest it fail at any time; therefore besides those upper

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per paſſages which are as it were the threſhold and dens, moreover more inner chambers and capacious are required, in which the air may be treaſured up, and from thence be diſpenced upon occaſion. For it ſometimes happens the external is too ſharp, or otherwiſe diſagreeable to the Lungs; ſo that as it was greatly neceſſary that it ſhould be ſuckt in more ſparingly, and its vehemence preſently be attempered and rebaited by the air treaſured within. Moreover it cannot be drawn in or inſpired otherwhile in quantity great enough, as in running, ſinging, or much ſpeaking, alſo in ſome crazy diſpoſitions; and in that caſe the inward air being rarified, ſupplies in a manner the defect of the outward.

Endued only with muſcular Fibres.

Therefore ſeeing thoſe bladdery little Cells receive a greater ſtock of air than that they can be bound preſently to return it all by every turn of expiration; therefore the griſly twigs are wanting to them, and their hollowneſſes are more large of themſelves, that they may be more largely diſtended: but that they may puff out a greater quantity of air upon occaſion, or throw out matter to be coughed out, being endued with Muſcular Fibres, they contract themſelves more narrowly, and throw out what is contained within them thoroughly. For the ordinary Syſtole's of the Breaſt, which the relaxation of the Muſcles do partly effect caſt out perhaps at every turn the whole air from the *Trachea* and *Bronchus*, but not from the little Bladders: for the emptying of theſe as often as need ſhall be, both the cavity of the whole Breaſt is very much ſtraitned, and the ſmall bladdery Cells themſelves are ſtraitned from their proper Fibres being drawn together.

The deſcription and uſe of the Pneumonic Artery.

2. The Next Veſſel is the Pneumonic Artery, of whoſe moſt thick branches extended every where to and fro, and with other branches twiſted and complicated together, the frame of the Lungs conſiſts. This Artery iſſuing from the right *Sinus* of the Heart, and inclining towards the *Trachea*, is parted into a right and left branch; which applying themſelves to the like parallel branches of the *Trachea*, do accompany them every where, or rather are ſet under them; for they are planted beneath, and are firſt carried into the greater Lobes of the Lungs, and afterwards into all the leſſer Lobes: in every of which the little branch of the Artery ſtretched out, ſends out on either ſide more ſlips from it ſelf, which preſently are aſſociated by other bronchial and venal ſlips, and are ſeveral ways complicated; and where the outmoſt ſprigs of the *Aſpera Arteria* depart into circular little Cells, the Arteries being complicated with the Veins (as is diſcovered by the Microſcope) do girt about thoſe little Bladders with their thick branching, and enwrap them like Ivy; from whence we may conjecture, that it is not for nothing that the Blood-veſſels that are any where in the Lungs, do curiouſly wait upon thoſe of the air, and every where inſinuate and intimately mingle themſelves. Surely whatſoever hath been ſuppoſed by others, I ſhall not eaſily believe that this is done for the more exact mingling of the Blood and its parts, be they never ſo unlike. For to do that, what need would there be of ſo full an acceſs of air, which in rightly making other mixtures (the more perfect whereof are called Digeſtions) we ſeek as much as we can to keep out? For if the air might freely come and go, the Particles that ſhould be mixed, would moſt of them flye away. And as to that which is affirmed, That the Blood in the Lungs is carried through thoſe ſmall, winding and extream narrow paſſages only that it may be the better mixed; I ſay, that its being ſo carried is quite contrary to ſuch an intention: For the beſt mixture of any liquor (as alſo of the Blood it ſelf) is made by fermentation; and the liquour to be ſo mixed or fermented, like Wine in a Hogſhead, requires a free and ſpacious room: but its going through theſe ſmall and narrow paſſages like ſo many ſtrainers, ſerves rather for the ſeparation than the mixture of its parts; wherefore unleſs the Blood be exactly mixed in the greater Veſſels, and be there rightly fermented, it does, while it paſſes through the Lungs, leave there the dregs and whatſoever parts are not rightly mixt, and ſo does ſtuff up and very much obſtruct their paſſages; as we may ſee in perſons affected with the Greenſickneſs, Cachexy, and that ſort of Dropſie called *Leucophlegmatia*, who all have a difficulty of breathing, by reaſon of dregs of the ill-mixt Blood that are left there. Wherefore the uſe of the Lungs ſeems to be this, That the Blood through the leſſer Veſſels, as ſo many rivulets, may as to all its parts lie open to and meet with the nitrous Particles of the Air, and be by them enlivened and accended. The Pneumonic Artery, as alſo the *Aorta* and Wind-pipe, hath a muſcular Coat furniſhed with two ranks of Fibres, namely ſtraight and circular; which doubtleſs, when they are contracted, do make the Pneumonic Arteries to beat, and the Blood to be urged and driven ſtill more and more forward. A great many Glandules with a Net of Veſſels lie on this muſculous Coat. The frame and branching of the Pneumonic Artery in ſome one Lobe of the Lungs are expreſſed in the ſecond Table. All the Coats of this Veſſel are drawn

drawn distinct and apart from one another in the sixth Table and first Figure, and also in the fourth Table and second Figure.

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The Pneumonic Vein, having its rise in the left Ventricle of the Heart, and being divided and variously subdivided first into greater branches, and then, according to the greater and lesser Lobes of the Lungs, into lesser, and lastly into the least of all, is carried above the Weazand, and as it goes on does exactly answer to the branching both of the Pneumonic Artery and the Weazand, and goes every where with them as it were cheek by joll; and where the Weazand ends into the little Bladders, the Veins being twisted with the Arteries (as was said before) do make as it were a little Net wherein those little Bladders are encompassed. The Anatome of the Pneumonic Vein differs little or nothing from that of the *Vena cava* and its branches. All the Vessels of this kind have four Coats distinct from one another.

The description and use of the Pneumonic Vein.

1. The outmost of these Coats consists of Fibres that seem to be nervous, which perhaps are after a sort muscular and are extended straight long-wise, (though in no very regular order.) This Coat of the pulmonary Vein is very laxe, and loose from the rest of the Vessel, insomuch that it may all of it be blown up and very much extended, as if it were a distinct Vessel: Whence one might suspect that this were a peculiar passage to carry back *Lympha* or *Serum* separated from the Blood: but it seems to be more probable, that this outmost Coat is therefore made so loose, that the passages might be much distended and widened for the return of the Blood now hot and boiling.

2. 3. Two other Coats (common both to a Vein and Artery) *viz.* the vasculous and the glandelous lie under this: the office of the vasculous is to bring nourishment to the part, and of the glandulous to receive and send away the superfluous serosities.

The use of the venous and vasculous Coat.

4. The fourth and inmost Coat is plainly muscular, having Ring-fibres, as the like Coat of an Artery hath, which certainly being successively contracted after the stream of Blood, do cause its return to be hastened, and on occasion to be shortned. But here arises a doubt, wherefore, seeing the Veins as well as Arteries have contracting muscular Fibres (which in the latter are pulsifick) and seeing both are alike joined to the Heart that beats continually, the Veins as well as the Arteries should not statedly beat according to the constant turns of the Systole's and Diastole's in the Heart? It may easily be answered to this, *first*, that the Arteries have a great deal more of the moving Fibres then the Veins have; and therefore whereas *those* being strongly contracted successively, do force the Blood along as if driven with a wedge, for *these* it sufficeth that whilst they are gently contracted behind the stream of Blood, they calmly and equally drive it forward, flowing back again of its own accord, and as it were down-hill. But *Besides*, the reason hereof seems to depend somewhat on the unlike or rather inverted conformation of the Vessels; for the Blood conveighed by the Arteries is driven still from wider to narrower spaces, and therefore going along it every where violently distends them, and lifting up the sides of the Vessels raises the Pulse; because whiles that part of the Artery that is behind the Blood is contracted by its muscular Fibres, that part which is before it, must needs beat being filled with the stream of blood gushing in: but on the contrary, the blood in the Veins returning to the Heart, runs out of less into greater spaces, or out of rivulets into a more capacious and deep chanel, and therefore glides along silently and without the fluctuating of a Pulse.

The Muscular Coat.

Why there is no Pulse in the Veins.

The blood in the pulmonary Veins seems as much, or more then that within the Arteries to be animated or inflamed anew by the air insinuating it self every where from the Pipes or little Bladders of the *Trachea*, because in those Veins 'tis first changed from a black-purple to a scarlet: the reason whereof is, because the blood at the extremities of the Vessels, namely as it passes out of the Arteries into the Veins, does every where and most of all meet with the particles of the air. And for that reason it is, that if any liquor be squirted into the Pneumonick Artery, it will not so readily and quickly pass through the Lungs and return by the Vein, as it will do if you make the same experiment in any member, or part of the body besides; yea part of the liquor so injected will sweat through into the Pipes of the *Trachea*, or the spaces between the little Lobes, and another part, being turned into a froth, will return very slowly by the Veins: which is a certain proof, that while it passes through the Lungs it makes a stay in the mouths of the Vessels, and is mingled with the airy particles. The Circulation of the blood through the Lungs hath something diverse from, or rather contrary to that which is made through the rest of the body; seeing the Pneumonic Arteries contain a black-purple blood, and the Veins a scarlet, whereas in all the body besides the branches of the *Aorta* carry a scarlet blood, and

The disposition of the blood in the Pneumonic Veins.

those

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those of the *Vena Cava* a black-purple. Besides we may observe of the pulmonary Vein, that it does every where in its whole length want valves, except where 'tis fastned to the Heart. Which appears by this, that when any liquor is injected into its trunk (just as it is in the Artery) it presently passes through all its branches without lett. Which ought to be so, to this end, that the blood may always, because of the violence of the passions, freely every way fluctuate and regurgitate in and about the Heart. Besides, that the left Ventricle of the Heart might never be overcharged with the blood impetuously rushing into it, by the instinct of Nature the Fibres at the root of the Vein being contracted, its course might be inverted and flow back. The description of the Pneumonic Vein as to its utmost branching is in the fourth Table and third Figure.

The Lymphæducts added to the aforesaid Vessels.

To these three sorts of Vessels, wherein the air and the blood are conveighed, the Lymphæducts that carry forth a water are joyned. A power of these dispersed through the Lungs, wait on the Arteries and Veins. All the branches tending from the surface of the Lung towards its original, unite into some greater trunks; which, being inserted into the Wind-pipe, discharge thereinto the Lympha that is superfluous from the blood and nervous humour. Indeed there is need of a great many of this sort of Vessels in the Lungs; because, seeing the blood is hottest of all here, is hastily circulated, and yet can exhale nothing to without by transpiration, the Veins can hardly receive all the whole mass of blood from the Arteries; and the Glandules contain not long what is deposited in them: therefore there is need of Lymphæducts as so many channels, whereby the superfluous humour might continually be sent off. If these at any time happen to be obstructed or broken, there often follows a Dropsie of the Lungs or Breast, and sometimes Coughs and Phthisicks. These lymphatick Vessels of the Lungs may very well be seen, if in dissecting a live Dog you press the top of the Thoracick duct, that nothing may be poured into the subclavian Vein: for then the Lymphæducts of the Lungs, because they cannot discharge themselves into the common Receptacle now stopt and filled, swell much and are very apparent. If such a stoppage be made for some time in a Dog that hath eat and drunk largely, a milky liquor will sweat into the Lungs out of the Thoracick duct, the Valves being unlocked: yea and the same liquor will pass through the Lymphæducts placed far beneath the Reins, and will render them strutted with that humour, as if abounding with milk. The rough delienation of the Lymphæducts spreading themselves in the superficies of the Lobe of a Lung, is represented in the first Table.

The nervous slips dispersed throughout the Lungs.

5. The last kind of Vessels belonging to the Lungs are the Nerves and their branches, whereof there are many (as we elsewhere intimated) dispersed every where through the Lungs. Heretofore doubting about the office of these, we were induced to think the first force, or at least instinct of breathing depended on these Nerves; because otherwise we can hardly conceive, after what manner the motion of the Lungs in breathing, coughing, laughing, and other their actions should be always so exactly proportioned according to the several exigences of Nature. For even as the blood doth more intensly or remisly heat and boil up within the *Præcordia*, and as certain contents of the *Trachea* provoke the nervous Fibres, we breath either quicker or slower, and oft-times, though unwillingly, we cough. But besides there doth occur another and more necessary use of these Nerves: for since it is manifest, that the Coats of those Veins and of the *Trachea* are every where endued with muscular or moving Fibres by which they are contracted, it is plain, that the Pneumonic Nerves do convey as well plenty of spirits, as inclinations of contraction to those Fibres. And it is very probable from those Nerves convulsively distempered, that the Palpitation of the Heart is often excited, as also the Asthma and Chin-cough. We have some time since delivered the Anatomy or description of the Pneumonic Nerves in our Treatise of Nerves, *viz. pag.* 311. so that there is here no need to repeat or inlarge. The fivefold Vessels forementioned being mutual, and many ways accompanied in their distribution, as if divided into secret Groves with small bladders as in Trenches every where interwoven, when they are complicated and variously woven together do constitute a fleshy web, which is the very structure of the Lungs: which moreover appears like a more solid *Parenchyma*, in as much the Arteries and Veins being filled with blood are stufft up, and the Vessels of the *Trachea* and Lymphæducts being emptied of the air as well as water, do fall together and seem to close. We shall the less admire the fleshy fabrick of this Lung wove together out of meer Vessels and little Bladders, if we consider the frame of the seminal Testicles to be nothing else than a heap composed of hollow filaments or spermatic Pipes woven together. The description of the Nerves of the Lung, and what relates to the bundle of Fibres whereof it is compact, and to the spreading of its branches, are described in the fifth Table.

The

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The web of the Lung, as above-ſaid, being weaved together of Veſſels and little Bladders, and divided according to their greater and leſſer branchings into Lobes and little Lobes, a Membrane wraps them about as a common covering. Of this there are two Coats, *viz.* one outer and fine, which appears like a certain ſubtle texture or weaving together of nervous filaments (as is apparent in moſt other Bowels;) the other more inward, which is both rough and ſomewhat thick, and conſiſting almoſt of meer ends of Veſſels and little Bladders: and by reaſon of the hollowneſſes every where cauſed from theſe, its inward ſuperficies reſembles a Hive of Bees; the forms of theſe are aptly enough deſcribed in the eighth Table. This Membrane of two Coats blown up hath very many and large Pores, inſomuch that if Quick-ſilver be poured into the Trachial branch of one of the leſſer Lobes, almoſt filling within the whole Membrane, it will every where burſt out from the Pores. Both the arterial blood and the air beating in this Membrane as againſt a bank, are reflected; the former is brought back by the Veins into the left Venter of the Heart, a certain watry part being ſent away through the Lymphæducts. In the mean while the air is returned back by the ſame paſſages of the *Trachea* by which it flowed in. For continually freſh air ought to be ſuckt in, that it might ſupply nitrous Particles to the Blood; to make room for which the other old air being now weak and uſeleſs, muſt be firſt breathed out. Becauſe therefore both functions are to be performed within the ſame paſſages, it is to be done by alternate turns, firſt the one, then the other. While the air is drawn in, the Lungs are blown up, as if wind were forced into them; and whilſt the ſame is breathed out they fall down, and are narrowly ſqueezed together for the benefit of excluding it; and ſo after the manner of Bellows diſcharge conſtant changes of the Syſtole and Diaſtole. Yet by what impulſe and Organs it is accompliſhed, is worth our labour here to conſider.

The Coats of the Lungs, whereof one is ſmooth, and the other rough.

Therefore upon the whole matter it is manifeſt by common obſervation, the Diaſtole of the Lungs perpetually ſucceeds the opening the Breaſt, and its Syſtole in like manner its contraction; ſo that we may conclude, when the cavity of the *Thorax* being dilated a greater ſpace is yielded to the expanſion of the Lungs, the extern air of its own accord leaps into the *Trachea*, whether by reaſon of the Pulſe, or by its own Elaſtic force (for it is all one) and preſently enters into its Trunk, the *bronchia* and all the little bladders, and blows them up; namely for that end, that its nitrous particles may every where occur to the blood, waſhing all parts of the Lungs: afterwards when the breaſt receding from that dilatation, is ſtraitned as to its cavity, even the Lung being compreſs'd, falls together by its Diaſtole, and excludes the air even now breath'd in. But truly, becauſe the air doth not of its own accord leap out with that plenty as it skipt in, neither the hollowneſs of the breaſt ſo ſtraightly contracted, that it ſhould mightily compreſs the Lungs; therefore all the paſſages of the *Trachea* are endowed with muſcular Fibres, which being contracted orderly while we breath out, they may promote the expulſion of air. Wherefore, that the cauſe of breathing, and the manner of doing it may more plainly be made known, inquiſition ought to be made after what manner, and by what Organs, that interchangeable dilatation and contraction of the breaſt are performed.

The Syſtole and Diaſtole of a Lung.

We cannot enough admire, concerning theſe motions, the cunning artifice of the Divine Creator, evidently adapted unto Mathematical rules; for truly in no other matter doth He more plainly appear ὁ Θεὸς γεωμετρῶν. For when both the enlarging and the ſtraitening of the breaſt ought to be performed by ſome muſcles (to whoſe function it only belongs to contract;) the matter is ſo ordain'd, that the ribs which ſhape out the ſides of the *Thorax* even as of oblong parallel lines bowed towards a Cylinder, are brought one while in a ſquare figure with right angles for the enlargement of the breaſt, and afterwards into the form of a Diamond-figure with ſides unequal, with acute angles for the contraction thereof. What follows from the ſituation of parts ſo chang'd, that whenas the ſides depart fartheſt from one another, the ends are brought nearer, and ſo *è contra*; and for that cauſe the largeneſs of the ſpace is wont rather to be altered than either augmented or diminiſhed; leſt it may ſo happen about the cavity of the *Thorax*, it is ſo provided againſt by an admirable workmanſhip, that whileſt the ribs aſcend upward for enlarging the breaſt to a ſquare figure, leſt the ends ſhould be ſhortned inward, the *Diaphragma*, which cloſes the bottom, ſwells downward toward the Abdomen; ſo that the *Thorax* may be enlarged as well towards its length as to its depth: on the contrary, while the ribs beneath are brought to ſtraiten the breaſt towards the figure *Rhomboides*, leſt they ſhould depart farther than they ought, the Diaphragma aſcends upwards for that cauſe that the largeneſs of the *Thorax* may be ſtraitened, while we breath out, according to both dimenſions.

Its motion mechanically unfolded.

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The Muſcles ſerving reſpiration.

What belongs to the muſcles of the breaſt, ſerving as well to the enlargement for ſucking breath, as to the conſtriction for breathing out, the moſt wiſe Creator of Nature hath ordained more and ſundry inſtruments of either function; Therfore truly that the work of breathing being eſpecially neceſſary as to life might be performed inceſſantly and very ſtrongly, ſome of the former order of Muſcles, *viz.* thoſe by which the hollowneſs of the *Thorax* is opened, do raiſe the ribs and afterwards draw them back, even as they are bow'd and more enlarg'd; in which number there are three muſcles to the ſhoulder, one belonging to the loyns, and eleven intercoſtal outward; and another inward muſcle, *viz.* the Diaphragma, depreſſes the bottom of the breaſt, and enlarges its length and depth.

Their function as well in inſpiration;

The aforeſaid muſcles, *viz.* the ſcapular, lumbar, and intercoſtals being alſo appointed with the Diaphragma for the function of breathing, are accurately enough deſcrib'd by many Anatomiſts, but chiefly by *Fallopius*, that here ſeems little need to unweave this web; eſpecially becauſe a more full and permanent knowledge of theſe parts is not wont to be acquired unleſs by frequent diſſections and anatomical inſpection. The four former muſcles being of divers forms, conduce chiefly to ſtronger and violent inſpiration; but the exterior intercoſtals in regard of the ordinary actions of breathing employ their continual endeavours by turns during life, every one of theſe being uniform, with a fleſhy and more thick baſis, being rooted in the bottom of the upper rib are carried by oblique fibres, and broad towards the forepart into the top of the rib that lyes under, and are implanted to it with a ſmall and tendonous end; whence it follows, thoſe fibres being ſwell'd; and ſhortened towards their root, do lead and draw back the nether rib towards the upper; and ſo while all theſe muſcles are contracted together, all the ribs are raiſed upwards, and altered from oblique angles into direct ones, they render the trunk of the *Thorax* more large, but ſomething ſhorter; which defect that it may be helped, the Diaphragma (which being free before from the Syſtole, is hidden within the cavity of the breaſt) together with the ribs drawn upwards, is extended beneath; ſo that the breaſt, as it were a Drum braced, does become moſt capacious; and in the mean time the Lungs, having a more ample ſpace yielded to them, are blown up by the air ruſhing in whereſoever there is paſſage, and fill the whole hollowneſs of the *Thorax* enlarged.

As in expiration.

Thusfar touching the muſcles ſerving to inſpiration, which ever and anon ceaſing from contraction, the ribs preſently fall drown from a direct poſition into an oblique; and the Diaphragma alſo being freed from its extenſion aſcends into the cavity of the breaſt, or is rather thruſt thither by the bowels of the Abdomen; and ſo by reaſon of the poſition of parts ſo changed, *viz.* the breaſt ſtraitned, and the Lungs compreſſed, the act of exſpiration doth ſucceed. Some have determin'd this to be a meer intermiſſion of the other, and only to proceed from the reſt, or ceaſing of the muſcular motion (by which breathing is performed.) But the declination of the ribs from right angles into oblique, and the aſcenſion of the Diaphragma, is related to be the natural poſition of theſe parts, becauſe they are found in ſuch a ſcituation in dead bodies. I think my aſſent not eaſily owing to this opinion, becauſe ſometimes the function of exſpiration is performed much ſtronger and more violently than that of inſpiration, as in coughing, ſinging, laughing, hollowing, and in other effects whoſe exerciſes are the more difficult labour and more earneſt endeavours of the breaſt Wherefore there is no reaſon that we ſhould think that ſuch vigorous exerciſes of exſpiration, ſhould be excited by the meer reſt and ceaſing of the aforeſaid muſcles, but from the motion of others oppoſed to them. Moreover the Muſcles now cited and oppoſite, and ſtraitning the breaſt, ſeem to be required not only by reaſon of their violent exſpiration, but for their ordinary and conſtant ſervice, at leaſt for the poiſing the function of reſpiration: for otherwiſe thoſe other whoſe office it is to enlarge the cavity of the *Thorax*, being ſometimes unmindful of their task, do it either ſtronger or longer than is convenient; wherefore it is neceſſary they be forwith admoniſhed by others, *viz.* their Antagoniſts ſubſervient to Exſpiration, and to be reſtrained in their duty. But the Muſcles appointed for the ſtraitning the breaſt, are the *Sacrolumbus*, the Triangular, and inward Intercoſtals, and ſome muſcles of the Abdomen; the uſe and deſcriptions of all which are delivered by many Anatomiſts and moſt accurately by *Fallopius*. The inner intercoſtal muſcles as they obtain a contrary ſcituation, ſo a contrary function to the outer intercoſtals, which namely is to depreſs the ribs, and to ſtraiten the cavity of the breaſt, by forcing it into the *Rhomboidal* Figure. For we are to obſerve, that the carneous and thicker baſis of each of theſe is implanted in the loweſt part of the nether ribs, and the moving fibres, aſcending from thence obliquely and forward, and dividing croſs-wiſe the reſt of the outward intercoſtals, with their ſmaller and Tendony end are engrafted in the bottom of the upper-

rib;

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rib; hence none need doubt, but that these inner muscles do depress all the ribs, or bring them downward: but whilst these ribs are so depress'd that the trunk of the breast is rendred more strait, these inward muscles (otherwise than the outer) do not only incline the ribs downward, but also their gristly or cartilaginous processes. For *Fallopius* hath acutely described this: *That the outward intercostal muscles do only fill up the inter-spaces of the ribs and not of the gristles, but the inward fill up both spaces.* The reason whereof seems to be after this manner, affording a most delightful speculation of the *Divine Architect*, viz. while the ribs are brought upwards to the exercise of fetching in breath, and are withal drawn back towards the Spine, that motion commencing backward, is performed by the ribs themselves; which being first moved together, the cartilages easily discharge their function as cords fitted to that purpose; wherefore there seems little need of the muscular aid to place these in their order; but to put the ribs in action, not only the intercostal muscles afore mentioned, but the four other greater ones do continually endeavour it; but on the contrary, that the ribs may be depress'd and brought forwards together, the force taking its rise before, is performed by the cartilages as so many leading cords, most easily bending the ribs downwards as far as need requires.

Moreover to this end, that the cartilaginous appendices of the ribs may be drawn down and nearer one the other for the exercise of expiration, not onely the inward intercostal muscles fill as well the intervals of the cartilages of the ribs, but moreover an entire triangular muscle is allotted for this function; for this springing beneath from the bone of the Sternon, and ascending upwards obliquely, is inserted into the lower Cartilages, which it constrains towards its head, and bends the *Thorax* nearer on the other side. That is worthy of consideration, which *Fallopius* hath remarked touching this muscle, *viz.* whereas it is so little and minute in a man, that it may hardly be allowed for a Muscle, it is stretched out in a Dog along the whole bone of the Breast, and reaches to all the Cartilages, even those inosculated into the Sternon of the true Ribs The reason of which difference clearly points at the Divine Providence touching the Fabrick of Animals. For whereas this Animal is born to most swift and long running, that the blood, while it is more vehemently agitated, may duly be kindled and fan'd, as it ought swiftly and strongly to draw in the air, even so to expire it; (for that fresh air may be more freely suckt in, it behoves that all the old be strongly cast out and exploded) therefore for the stronger discharge of this exercise (of the which little use in a man) this Muscle of a Dog is allotted a great bulk, proportionable to such a work.

Wherefore the triangular Muscle being small in a man, is stretched out through the whole bone of the breast in a Dog.

Hitherto of the Muscles that straiten the Trunk of the Breast: by whose provision it is manifest enough, that the relaxation of the opposite muscles are not sufficient to this function. But that while the breast is constrained, the Diaphragma ascending upwards may shorten its hollowness, it is not enough that it is released from its contraction, but it is also necessary, that as soon as this ceases, the muscles of the Abdomen being contracted squeez together the Bowels, and press them upwards, by which the Diaphragma being relaxed, is lifted up and driven higher into the Trunk of the *Thorax*.

The Diaphragma follows the motion of the Abdomen.

From the supposed reasons of these things we may infer, no less endeavours of the muscles are imployed in the exercise of expiration, than in inspiration: nay rather we may affirm them greater, after this is added, that the Pipes of the *Trachea* and *Bronchii* are endowed with muscular Fibres (as we have shewed) which being only contracted while we expire, do cause the air contained within to be cast out with the greater force. And truly so it ought to come to pass, because the air prevailing with an elastic force, doth of its own accord readily enter the plumonary passages, as often as they are suffered to be open; but from thence that again it may presently and thorowly be excluded, there needs a certain force and compression of the parts to thrust out. For although the inspiration precede in course, yet it is necessary that expiration follow immediately after, and be proportioned according to the fashion thereof; for that it may be great, the turns or changes of this being greater are requisite. Wherefore in vehement exercise of the whole body of the Lungs alone that the fresh air may more plentifully be drawn in, all the old air must be moved, not only out of the *Trachea* and *Bronchii*, but also out of the farthest little Bladders every turn or change of breathing out, and expulsed most of it: whereas while we draw in the breath only the muscles of the Breast are imployed, the Lungs having respite, in strong breathing out both the opposite Muscles and the Lungs themselves labour.

The labour of Muscles the same in exspiration as in inspiration.

Having thus explained the Organs of Breathing, it remains yet to be inquired into, by what instinct, being stirred up to motion, they so repeat perpetual changes of Systole and Diastole, that one while these muscles are contracted for inspiration, and another

The causes of the above-mentioned motions.

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another while for expiration, in the mean while the oppoſite muſcles have a pauſe, and are moved by turns, that they mutually give place to themſelves ſucceſſively. From all this in the firſt place it is clear (which likewiſe in another place we have abundantly declared) that the animal Spirits, for the exerciſing the contractive motion of the muſcles, leap from the Tendons into the fleſhy Fibres, and afterwards for their relaxation they recede out of theſe into thoſe. Moreover, whereas the mutual function is twofold,

In the animal function.

viz. ſpontaneous and meerly natural, we have before ſhewed in the former, that the Spirits are brought from the Tendons into the fleſhy Fibres by approaches according to the command of appetite, and to remain within during the action, till they are diſmiſſed by its will; and afterwards return into the Tendons, till they are again commanded forth; inſomuch that the times of their motion and reſt are unequal and uncertain, and variouſly determined at our pleaſure.

And natural.

But it is far otherwiſe in the natural function: becauſe the animal Spirits are carried out from the Tendons into the fleſh by perpetual turns, or conſtant reciprocation, and a ſhort contraction being made, preſently leap back from the fleſh into the Tendons, and ſo alternately: after which manner the Heart it ſelf, the Organs of the *Trachea* and breathing, alſo the fleſhy Fibres of the Stomach and Guts, unleſs they are otherwiſe limited by reaſon of their objects, are drove on by their conſtant Syſtole and Diaſtole.

The motion of the former ſort ariſeth from the brain, the other from the Cerebellum.

It will be needleſs to repeat here what we have already obſerved in another place touching theſe two kinds of motions, *viz.* that the animal ſpirits of the ſpontaneous moving function are altogether or chiefly diſpenſed from the brain, and the others cauſers of the meerly natural function are diſpenſed from the *Cerebellum*; moreover alſo as the plenty of both ſorts of ſpirits, ſo the very inſtincts of beginning thoſe actions have their conveyance through the Nerves.

It is a quære of what kind the actions of breathing are.

Notwithſtanding here ariſeth a doubt, to what kind of moving function, *viz.* whether ſpontaneous, or meerly natural, the actions of breathing ought to be referred; alſo of what original, *viz.* whether of the Brain or *Cerebellum*, the animal ſpirits appointed to that employment, are. It is manifeſt enough that this function is in a ſort partaker of a ſpontaneous motion, becauſe it is in our power one while to ſhorten its exerciſes, at other times to prolong, and otherwiſe diverſly to alter them, yea ſometimes a little to reſtrain them. Moreover the nerves belonging to its chief moving Organs, *viz.* the Diaphragma and Muſcles of the breſt, ſpringing from the nerves of the Arms and Loyns, do owe their deſcent to the Brain, and do plainly acknowledge the ſpirits they contain are chiefly ordained for voluntary motions; but moreover on the contrary, this function is ſo far natural, that its organs do reciprocate the conſtant changes of Syſtole and Diaſtole in ſleep, without our notice, and while we wake, we not perceiving it: Moreover although we can for ſome little time ſtop its exerciſe, or at our pleaſure vary it, yet we deny it to be altogether or long ſuſpended: beſides, although the nerves appointed to the muſcles of the Breaſt and Diaphragma proceed from the ſpinal nerves, yet theſe latter coming from the branches belonging to the arm communicate in their progreſs with the ſlips of the intercoſtal nerves; moreover, all the other nerves (which belong to the *Cerebellum*) ariſe from theſe, which are ſpread about through the *Trachea* and Lungs.

It is concluded to be a mixt act.

From theſe it plainly follows, that the power of breathing is as it were a mixt action, and doth participate of either moving function, *viz.* as well of the ſpontaneous as natural; and that the ſpirits and nerves of either Province are imployed in this duty, which proceed as well from the brain as from the *Cerebellum*; and truly ſo it ought to come to paſs according to the animal government: for although ſome actions of breathing neceſſary for the preſerving life ought to be conſtant and perpetual, there are yet many other motions of the breſt and lungs only occaſional, and to be perform'd at our pleaſure, as may be diſcerned in laughing, crying, ſinging, hollowing whiſtling, and other ſingular offices of the lungs and wind-pipe; in which works that they may be done ſtrongly, the muſcles conſpire together, and endeavour joyntly. As in violent labours and exerciſes of the whole body, by which the blood being ſtirred up doth want the greater ventilation, the arms being vehemently moved alſo do force the muſcles of the breaſt, and other pneumonic organs, into more ſpeedy motions for a more frequent breathing. And truly for joint labour of this ſort of the Arms and Diaphragma, the nerves ſerving this motion proceed from the nervous branches of them. Moreover, it is provided for this purpoſe, leſt the exerciſes of the body might enfeeble at any time the ſtrength of the lungs, or exceed the order of breathing; for when its organs labour more difficultly, or begin to be weary, the nerves of the Diaphragma do warn the other nerves of the arms, plucking them and as it were admoniſhing of their duty to deſiſt from an over intenſe motion.

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For whereas the function of breathing is ordained for many uſes, whereof ſome are merely natural, and others ſpontaneous or violent; therefore the ſpirits and the nerves which proceed and have their government as well from the brain as from the *Cerebellum* ought to be joyned together, and to afford their ſocial endeavours; yet on that condition, and as it were by mutual agreement, that one give place to the other by turns for the diſcharging all works chiefly neceſſary, or convenient, and do mutually obey. From the pneumonick nerves, the inſtinct of ordinary breathing or meerly vital beginneth, and is preſently communicated to the nerves of the Diaphragma, and from thence to all of the *Thorax*; ſo that preſently all the moving parts agree together in the action, and cauſe the Syſtole and Diaſtole of the breaſt in ſuch ſort as are required to the preſent ſtate of the blood; notwithſtanding on the contrary, as to other actions of breathing, whether ſpontaneous or violent, it ſeems to have them alſo, *viz.* the inſtinct or firſt force of theſe, beginning one while from theſe muſcles, another while from them is preſently communicated to all the other Organs; ſo that it is called upon by a working conſort of all together ſooner than the twinkling of the eye, for the performing the deſigned acts of breathing.

The nerves of the lungs ſome rulers of the natural motion and others of the voluntary.

Both do alternately obey one the other, and agree in their office.

What we have hitherto declared about the Organs of Breathing and their functions and uſes, that they may more clearly be manifeſt, it ſeems to be material to expoſe to your view the forms of ſome of their chiefeſt parts deſcribed to the life, together with the explication of their Figures: yet it ſeems proper firſt to inſert a few things concerning the Lymphæducts and interſpaces of the Lobes omitted in the former Diſcourſe.

The moſt renowned *Malpighius* firſt diſcovered theſe little Lobes of the Lungs and their interſpaces; but to what uſes they ſerve he hath not clearly enough ſhewed. Haply it may ſeem that theſe little places and empty ſpaces within the Lungs, are certain receptacles of the air (that there may be a larger ſtore of it.) Notwithſtanding it is evidently manifeſt upon experiment frequently made, that the air pufft into the Pipe of the *Trachea* (which is the only entrance into the Lung) doth not enter or blow up theſe interſpaces of the little Lobes: notwithſtanding if you blow into the hole of any of theſe interſpaces, immediately all theſe ſpaces pufft up do ſwell in the whole lobe of the Lungs, ſo that all the little lobes diſtinct by great interſpaces, will appear with a pleaſant proſpect; as is expreſſed in the ſecond Figure of the third Table. Moreover the Lymphæducts creeping through the ſuperficies of the Lungs, ſeem to be every where included in little Membranes covering thoſe interſpaces, and to end in them. But as the lymphatic Veſſels are all furniſhed with little valves, ſo thoſe which appertain to the Lungs are furniſhed with almoſt infinite; as is to be ſeen in the warm large lobe of an Ox, and expreſſed to the Life in Tab. 1. d, d, d, d.

The interſpaces of the little Lobes have paſſage one into the other, and from thence into the Lymphæducts.

That I may dare to conjecture concerning the uſe of theſe things; it is probable, that thoſe cavities intercepting each little lobe, do receive the vapors flowing copiouſly every where from the blood being kindled, (when they cannot any where elſe be better thruſt down or ſeparated) which ſweat through their ſlender Coats into theſe cavities out of the ends of thoſe Veſſels, and thence being forced further, they are condenſed into water to be carried out of the Lungs through thoſe appropriate Veſſels: moreover leſt the Lympha's cauſed from vapors within thoſe paſſages, and ſo being made thick, ſhould whirle again back into the Lungs (which would bring great prejudice to them) the thickeſt obſtacles of the valves do hinder. For I have frequently admired what becomes of the vaporous ſteams which inceſſantly flow in great plenty, and ſometimes moſt impetuouſly out of the blood burning ardently in the *Præcordia*. For although very many of them flye away through the paſſages of the *Trachea* together with the air while we breath, notwithſtanding one only way of paſſage or particular ſluice doth not ſuffice to them, from every place breaking forth: wherefore theſe little places or empty ſpaces are every where placed, that they may receive thoſe vapors ſhut up in the lungs, and may drop out the ſame immediately condenſed through the Lymphæducts, as if through ſo many noſes of an Alembick.

Which therefore is done, that the vaporous ſteaming of the blood being received by the interſpaces, and condenſed into water in the Lymphæducts, may be conveyed out.

The lymphatick Veſſels having their paſſage out of the Lungs incline towards the paſſages of the *Thorax* with their numerous branches, and are for the moſt part mingled with them; but they climb upon the *Oeſophagus* in their way, as alſo the trunks of the *Trachea* and the *Aorta*, and do loſe many ſlips in them by a various inſertion; likely for this cauſe, that ſome of the lymphatic humor may be beſtowed for making ſlippery the ſides of thoſe Veſſels.

The progreſs and diſtribution of the pulmonary Lymphæducts.

The

PHAR. Part. II.

The Explication of the Figures.

THE firſt Table ſhews one entire Lobe of the Lungs, upon whoſe ſuperficies the Lymphæducts are ſeen ſpread through every where.

A. *The Orifice of the* Trachea *being cut lying in the midſt of the Veſſels.*
B. *The Orifice of the Pneumonic Artery lying under.*
C. *The Orifice of the Pneumonic Vein placed above it.*
d, d, d, d. *The outer Lymphæducts ſpread abroad through the ſuperficies of the Lobe.*
e, e, e, e. *More Lymphæducts meeting on the back of this Lobe, from whence they paſs into the Thoracick ducts.*

The ſecond Table ſhews one Lobe of a Sheeps Lung cut in the midſt, that the upper part (wherein is the trunk of the Vein) being removed, and the trunk of the *Aſpera Arteria* laid by it ſelf, the branching of the Pneumonic Artery is ſhewn throughout its whole frame, *viz.* through the ſmall and leaſt little Lobes. All the paſſages of this, *viz.* the ſlips and twigs how ſmall ſoever, being filled and coloured by any liquid thing caſt into them, are drawn to the life.

A, A, A, A. *The nether half of the Lobe divided, containing the branching of the Pneumonic Artery.*
B, B, B. *The Trunk of the Pneumonic Artery belonging to this Lobe.*
C. *A hole from whence its other branch was cut off and removed.*
D, D, D, D. *The Trunks from which its other branches (becauſe they could not be expreſſed in this Table) were cut off.*
E, E, E, E. *The arterious ſtems thereof ſtretcht forward into length, the ſide-branches on both parts ſtretcht out into the right and left ſide.*
F, F, F, F. *The twigs and leſſer ſlips, which are every where intermingled with the like from the Veins and Bronchials; and at laſt woven together with the Veins every where encompaſs the orbicular little Bladders, and bind them as it were in cluſters.*
G, G, G, G. *The Bronchial branches, which being cut from the ſtem of the* Trachea *laid aſide, and entring ſecretly into this Lobe of the Lungs, are accompanied with branches that bear blood.*
H, H. *The ſtem of the* Trachea *appertaining to this Lobe, which lay upon the Pneumonic Artery, cut and laid aſide.*
f, f, f, f. *The ſtems of the Bronchial branches, which are immerſed partly in this portion of Lobe deſcribed* G, G, G, G. *and are partly diſtributed in the other half cut off.*

The firſt Figure of the third Table expreſſes one Lobe of the Lungs, according to the branchings of the *Aſpera Arteria* divided into leſſer and leſs Lobes, the twigs and ſlips of which Veſſel being filled by a liquid firſt injected, and afterwards ſeparated from among themſelves towards the little Lobes, are alſo drawn to the life.

A. *The Trunk of the* Aſpera Arteria *being cut from the reſt of its body.*
B, B, B. *The inner part being cut open, that as well the holes leading into all its branches, as its ſtraight muſcular Fibres, are viewed together.*
a, a, a. *The above-mentioned holes leading into the every where ſtretched out branches.*
b, b, b. *The ſtraight muſcular Fibres, upon which the other circular do lye.*
C, C. *The upper part of this Tracheal ſtem being whole or ſhut, that the Ring-like Griſles might appear.*
D, D, D, D. *The branches of the* Trachea *conſtituting the leſſer lobes are whole and ſhut that the Ring-like Griſle may alſo appear in them.*
E, E, E, E. *The like branches being cut open, that the holes and ſtraight muſcular Fibres may be ſeen together.*
F, F, F, F. *The trunks from which the Tracheal branches being cut off are removed, that there may be ſpace afforded to the reſt when cut open.*
G, G, G, G. *The ſecondary little Lobes hung upon the trunks of the* Bronchii *as grapes, which alſo may be divided into leſſer Lobes, the more inward paſſages of all which paſs out of the* Bronchii *into the little bladdery Cells.*
h, h, h, h. *The veſſels bringing blood crawling over the ſuperficies of thoſe little Lobes.*

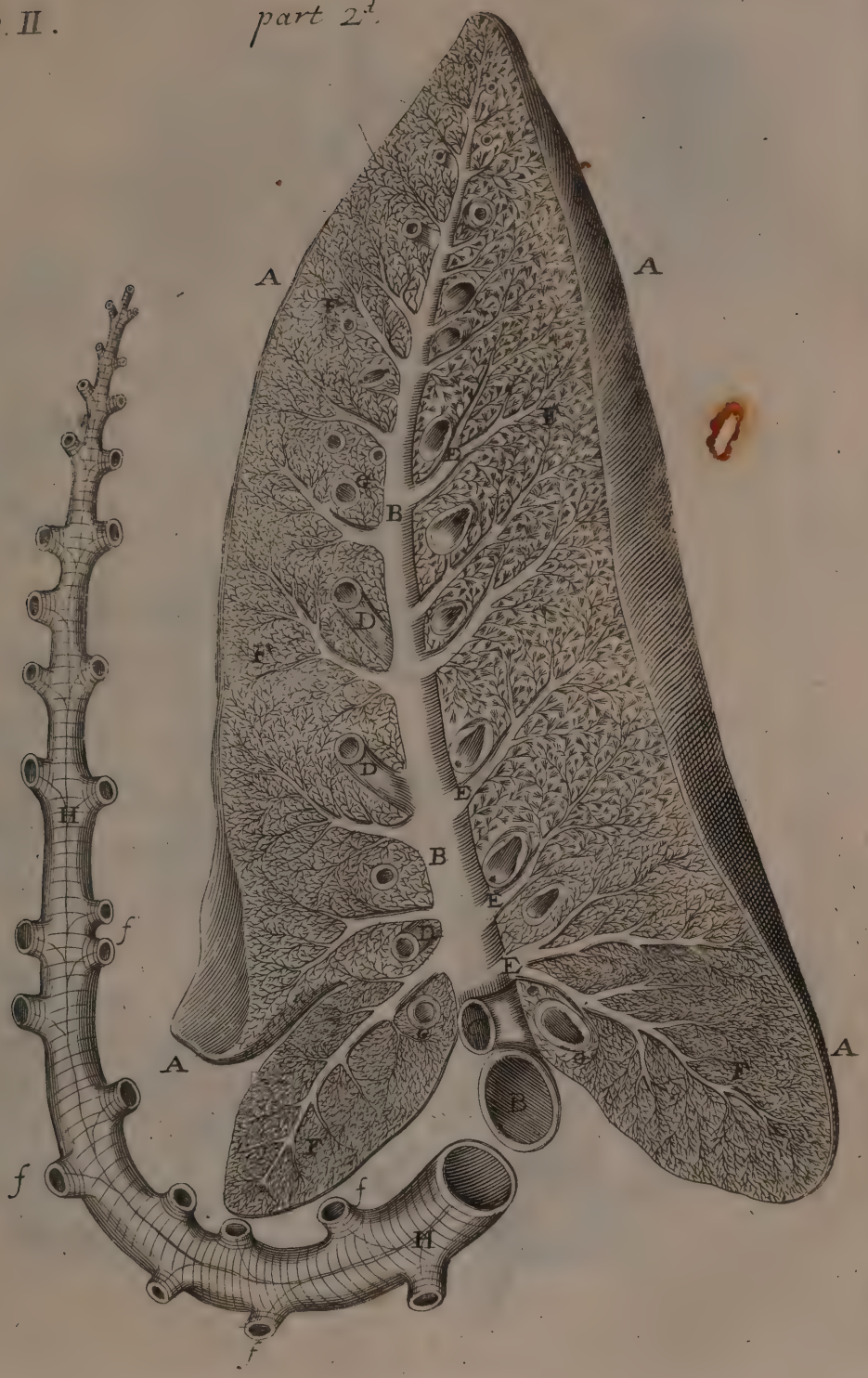
The ſecond Figure of the third Table expreſſes a part of the pulmonary Lobe, where-

in

Tab: 1. Myalia

Sect. I. Cap. 1. part. 2.

Tab. II. part 2.



Tab. III.

Aaa. P. 14.

Fig. 2.

Fig. 1.

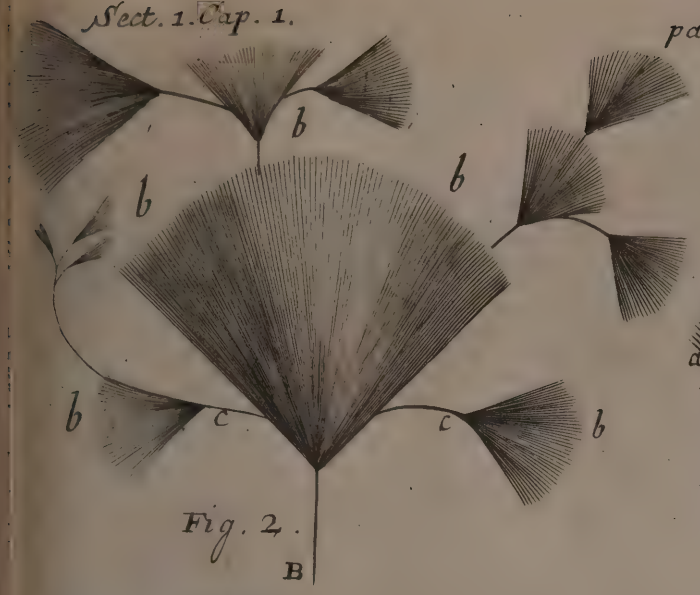
Tab. IV.

part 2d.

Fig: 1.

Fig: 2.

Fig: 3.



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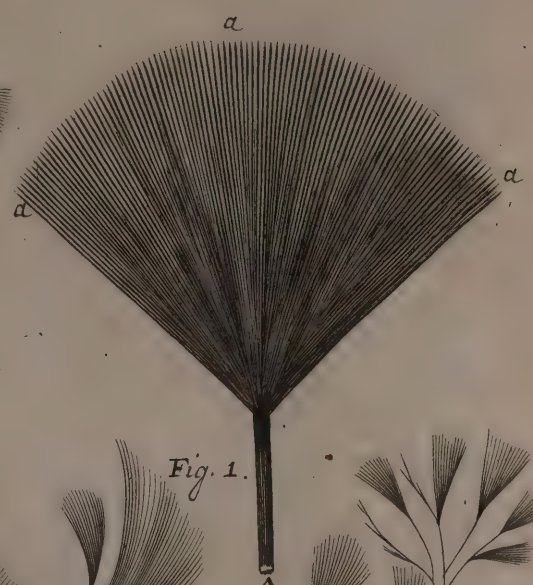
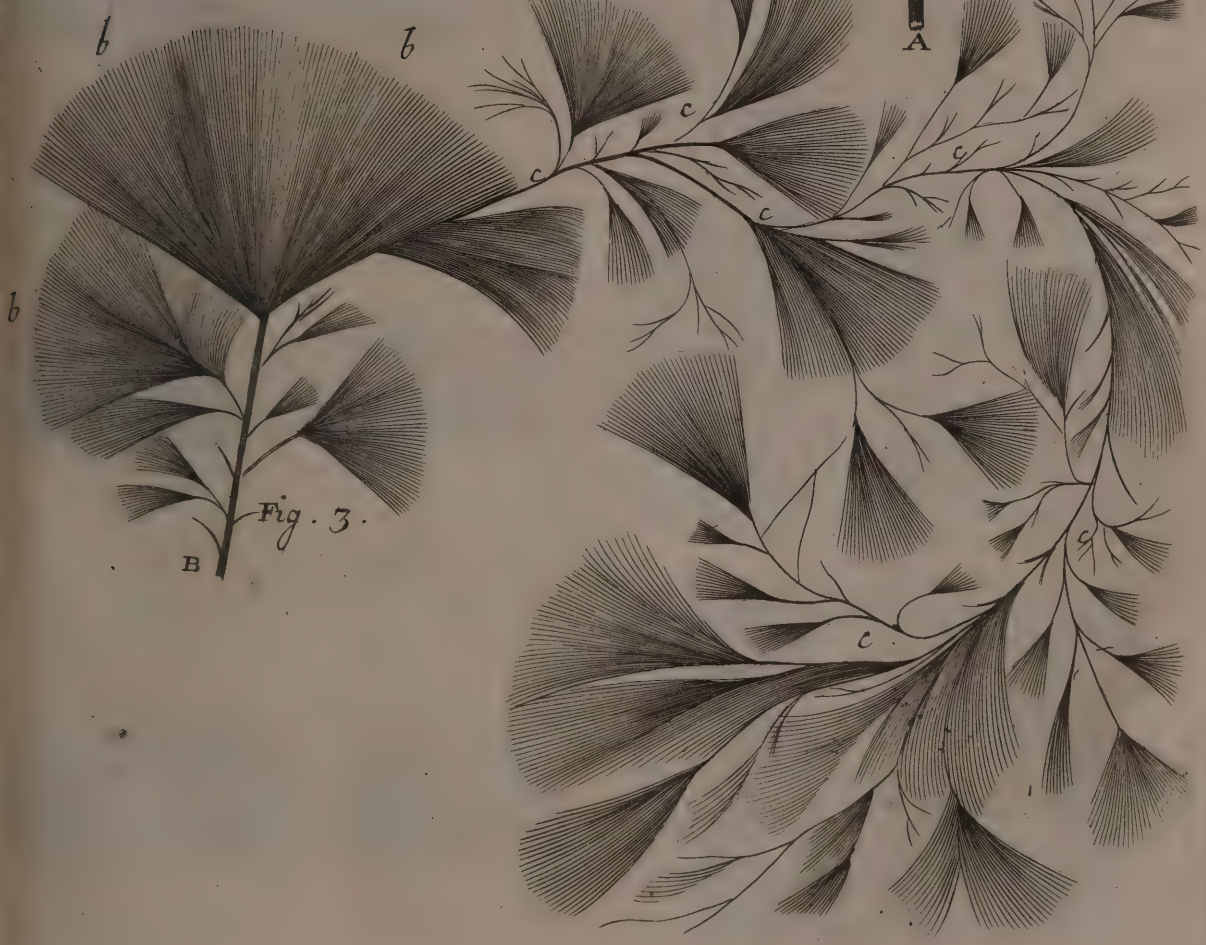


Fig. 1.



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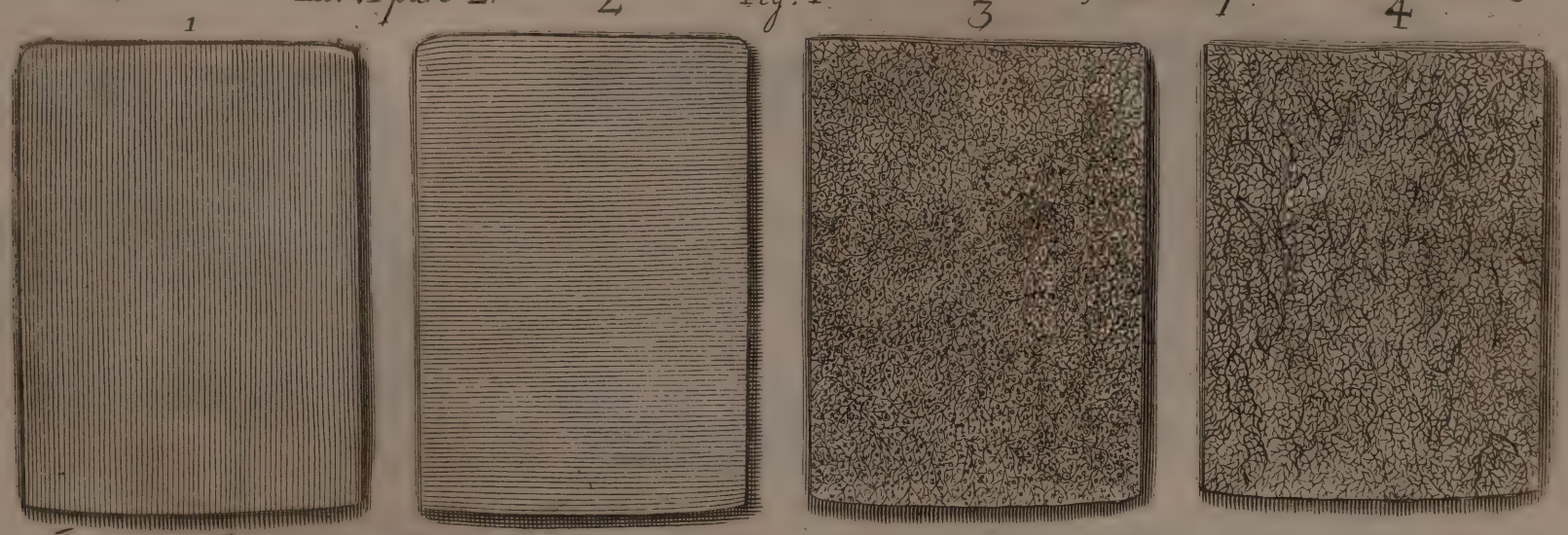


Fig. 2.

Sect. 1. Cap. 1. Tab: VII part 2d. &c. P. 15.

Fig: 1.

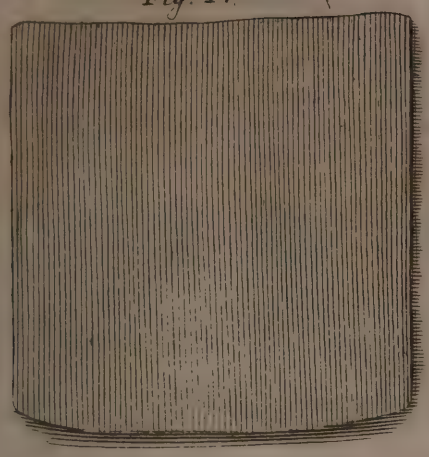
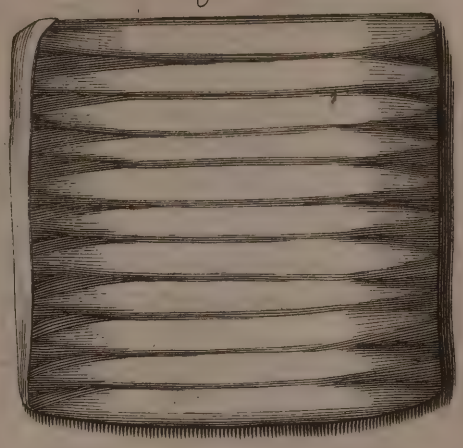


Fig: 2.

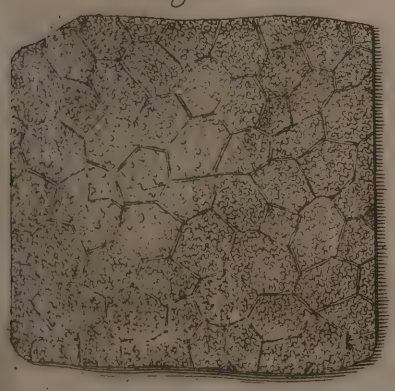
Fig: 3.

Fig: 4.



Sect. 1. Cap. 1. Tab: VIII part 2d.

Fig. 1.



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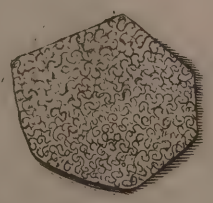

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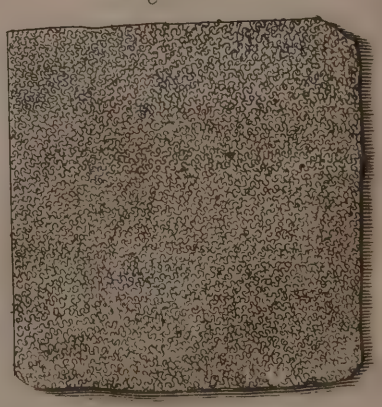

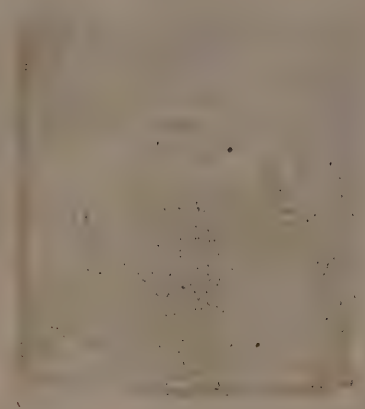

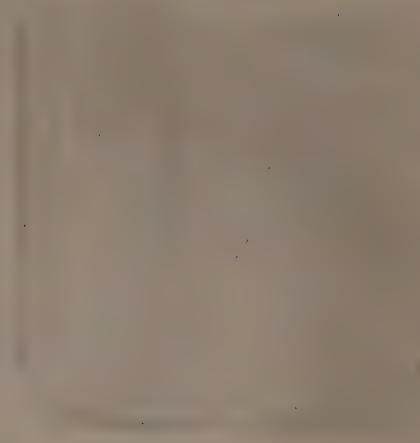

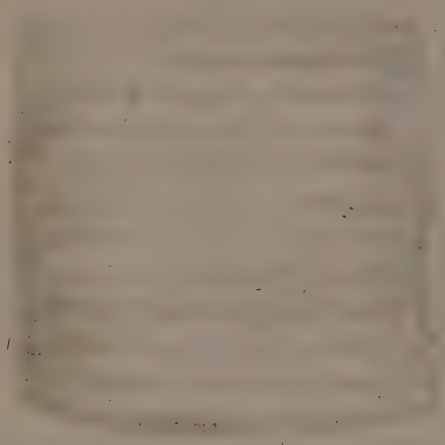

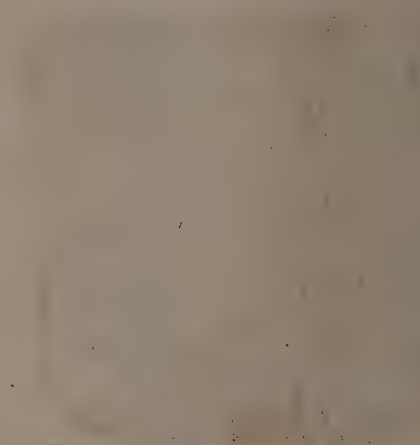

in the membranous interſpaces being blown up, all the little Lobes appear in their proper figure, and do ſomewhat repreſent the leaf of Polypody. PHAR. Part. II.

A, A. *A part of the* Aſpera Arteria *complicated with the other Veſſels, to which trunk made up of all thoſe, the little lobes grow like leaves of a tree.*
b, b, b, b. *The little Lobes themſelves.*
c, c, c, c. *The Veſſels bringing blood creeping through them.*
d, d, d, d. *The membranous interſpaces of the little Lobes, which alſo are covered with*
e, e, e, e, *the Veſſels bringing blood.*

The fourth Table expreſſes as well the Veſſels belonging to the *Trachea* as thoſe bringing blood, ſeperate and diſtinct one from another, conſtituting one little Lobe, as alſo the peculiar framing of every one of them.

The firſt Figure repreſents the ſeperating into divers parts the Tracheal branch diſtributed into one little Lobe, and the branching into Pipes and orbicular little bladders.

A, A, *The trunk of the* Aſperia arteria, *in the ſuperficies whereof the ring-like griſtles do appear.*
b, b, b, b, *The leſſer branches going from that trunk, wherein alſo little Rings appear.*
c, c, c, c, *The paſſages of thoſe branches into orbicular litte bladders, which ſeem like the cluſters of Grapes.*
d, d, *The Veſſels bringing blood, diſtinct from the Pneumonic which cover the Trachea, and ſerve to nouriſh it.*

The ſecond and third Figure ſhews diſtinctly the equal branchings of the Artery and Pneumonick Veins within the ſame little Lobe; both which being complicated with Tracheal Veſſels, do for the moſt part make up the texture of the pulmonary frame.

The fifth Table ſets forth the pulmonary Nerve more accurately deſcribed by the aid of a Microſcope: ſo that it plainly appears that the Trunk is as it were a bundle of innumerable little Fibres bound together; Moreover its Trunk, while it creeps into the Lungs in the likeneſs of Mother of Time, doth ſpread the various little ſprigs every way.

Fig. 1. reſembles a part of the nervous trunk cut away, one end whereof being opened and lookt on by a Microſcope, ſeems to unfold it ſelf almoſt into innumerable little fibres.

A, *The Trunk of the Nerve.*
a, a, a, a, *The little Fibres divided from one the other about the end cut off, and ſpread abroad.*

The ſecond and third figure do ſhew ſome fibres as well of the trunk as of every branch, and moreover the ſlips of the little twigs from divers ſtemmes often repeated.

B. *The chief trunk.*
b. b. b. b. *The little fibres about the extremity cut off explicated.*
c. c. c. c. *The little twigs ſpringing from the bundles of the little fibres.*

The ſix Table firſt ſets from the anatomy of the Artery bringing blood drawn in apt figures, which we have deſcribed in a late treatiſe.

The firſt and upper figures hereof, repreſent the four diſtinct Coats of that Veſſel, *viz.* the nervous, muſcular, glandulous, and the vaſculous.

1. *The firſt inward nervous coat*, which perhaps is ſomewhat muſculous, conſiſting of ſtreight or long fibres, which being contracted ſhorten the Pipe of the Artery.

2. *The coat properly muſcular*, conſiſting of a heap of ſmall circular fibres, which when they are contracted ſucceſſively under the ſtream of blood, do make its circuit to be ſhortened. It is from the motion of theſe that the arteries beat.

3. *The glandulous coat*, which (like that in the guts) being placed over the muſculous coat, is weaved together of very ſmall and moſt numerous glandules.

4. *The outward vaſculous coat*, which variouſly folded together and wreathed, of Veſſels bringing blood, and with ſlips and nervous fibres, ſeems like a certain little net.

The *ſecond and lower figures* of the ſixth Table, do ſhew the anatomy of the Vein, or its four coats expreſſed in fit places; which Coats do appear entire as ſucceſſively taken one part from the other (beginning outmoſt.)

1. *The*

PHAR. Part. II.

I. *The outward coat* conſiſting of nervous fibres (which perhaps are ſomewhat muſcular) and as it were ſtreight or ſtretch'd out in length, although not orderly.

II. & III. *The vaſculous and glandulous coat*, which are the ſame as in an Artery.

IV. *The moſt inward muſcular coat*, conſiſting alſo of circular fibres as in an Artery, which being contracted behind the ſtream of blood, haſtens its returning courſe.

The ſeventh Table expreſſes the diſtinct Coats of the *aſpera arteria*, and ſeparated one from the other.

The firſt figure ſhews the moſt inward Coat, endowed with ſtreight or long muſcular fibres.

The ſecond figure deſcribes the glandulous coat, and the third figure the vaſculous coat (which are almoſt the ſame as in the veſſels bringing blood, and alſo in the Guts.)

4. *The fourth figure expreſſes the outward coat* (which is partly cartilaginous, and partly muſcular.) The tranſverſe or annular fibres hereof do fill up and weave together the interſpaces of the Cartilages.

The eighth Table ſhews a part of the utmoſt pulmonary Coat covering over its whole frame, moſt finely and curiouſly deſcribed by the help of a Microſcope.

The firſt Figure ſhews a portion of the above mentioned coat, which partly by reaſon of the extremities of Veſſels of every ſort ending in it, ſeems pricked full of holes as it were, and partly from the complications of the veſſels bringing blood, which like the twining ſprigs of Vines gird about the orbicular bladders, is diſtinguiſhed into many irregular *Area*'s.

The ſecond Figure repreſents a part of the outermoſt membrane ſeparated from the cluſters of veſſels pull'd off, and without any *Area*, only markt with little holes as it were with ſmall pricks.

The third Figure expreſſes one ſingular *area* of the Coat above mentioned, augmented in largeneſs by the help of a Microſcope.

SECT. I. CHAP. II.

Of the ſundry kinds of Breathing hurt, and their cauſes, with the accounts of their Symptoms.

HItherto we have ſtrictly viewed the Lungs, and the parts any way ſerving their motions, and conſequently the vital function; which being many and different, and the proviſion of the Organs as many very accommodate to breathing; ſo the ſame are many ways in hazard to be perverted or vitiated, upon ſundry occaſions. Truly a Watch framed with the greateſt artifice with a Spring, with wheels plain and toothed, with chain and ballance, is not more prone or eaſie to be obnoxious to depravation than this Pneumonic machine of the breaſt, through which by ſucking in air we preſerve the vital flame of the blood with its motion and heat. For whereas the veſſels of the Lungs belong to the function of breathing, *viz.* the *Trachea*, with the *Bronchii* and little bladders; alſo the heart with arteries and veins, beſides which there are nerves with fibres as well muſculous as nervous, Lympheducts and Glandules; alſo the contents of theſe Veſſels, *viz.* Air, the old and freſh blood, with its *Serum*, the Lympha, and the animal Spirits; any fault happening in any of theſe doth oftentimes diſcompoſe the whole Pneumonic function. Nor leſs alſo the moving Organs of the breaſt, *viz.* the muſcles with the Diaphragma, and the nerves appointed to their uſe. And likewiſe ſometimes the animal ſpirits before they enter into thoſe nerves, being ill diſpoſed, often cauſe great diſorders in breathing.

The organs of breathing being hurt, the breathing is hurt alſo.

The uſes and ends of breathing which uſe to be hurt.

When the chief function and uſes of the Lungs have been to convey the blood and air through the whole frames of the parts and their inmoſt receſſes, and every their ſmalleſt paſſages, and every where to mingle them; namely for that purpoſe, that the venal blood returning from its circuit, and diluted with freſh juice, and thereby crude and as it were half extinct, may as well be more perfectly mix'd and wrought together, as more effectually kindled afreſh in all its parts by the nitrous air; from hence the chief faults about this buſineſs or function of the Lungs do moſt of all conſiſt in theſe two things. Firſt, that the blood hath not due paſſage through the *Sinus* of the heart, and the pneumonic veſſels: And ſecondly, becauſe the Air is not drawn in and breathed out in a due manner into the *Trachea* and its paſſages.

There.

PHAR. Part. II.

The defects and failings of the Lung in its office.

There are two parts of either of these: For first as to the passage of the blood, sometimes the fault is caus'd within the right *Sinus* of the heart, or the pneumonic Arteries; and also sometimes caused within the pulmonary veins, or the left Ventricle of the heart: Secondly, as to the Air, the failure is chiefly in inspiring and exspiring; although each function offends sometimes equally. There are divers accidents of each and many causes and ways of its being done, whereof we will here briefly touch upon the chief.

First in respect of the blood.

Therefore first, when the blood doth not duly pass through the right Ventricle of the Heart and the Pneumonic Arteries, either it happens by its own fault, or by the fault of those passages, and sometimes by the fault of further passages. For sometimes the stream of blood stops in the nether region of the *Præcordia*, by reason of obstruction in the other; moreover, sometimes the defect or fault of the air breathed in stops the free passage of the blood.

The opinion of the famous Sylvius concerning the blood fermenting in the Lungs.

What relates to that fault of the blood, when it passes not quick enough through the right *Sinus* of the Heart and Pneumonick Arteries, the opinion of the Renowned *Sylvius* should here be discoursed, but that it would be too tedious, and from our purpose. For he supposes, *The descending branch of the venal blood, moistned with chyme together with the lymphatic humour returning from the whole body, hath the nature of an acid-sweet Spirit; and in the mean time its branch ascending impregnated with choler from the bladder of the gaul mixt into the mass of blood, does participate of an oily volatile salt; and so by the meeting together of these something contrary to themselves, a gentle and friendly contention or boiling is stirred up in the right ventricle of the heart, in which and for which the fiery parts lurking and being shut up in each, being freed and set at liberty, do rarifie the chyle and blood, and so change and alter them, that they exercise the function of life and heat as well as motion and nourishment through the whole body.* There are many reasons why I assent not to this ingenious and neatly-framed Hypothesis. For besides that many do far otherwise determine about the origine and dispensation of Choler, and so not without strong reasons and experiments are thorowly perswaded, (by eye-sight) that there is not any such boiling up of the blood of a different quality, and striving or contending in the right ventricle of the Heart: Our judgment continues still, as it hath been, that both streams of blood, washed thorowly with the fresh chyme, do consist altogether of one kind; and for that cause the milky Vessels of the Chest carry about part of the Chyle so long a journey, which they pour into the descending trunk of the *Vena cava*, just as the Meseraick Veins pour the other part into its ascending trunk: also that the lymphatic humor together with the Chyle is poured into the subclavian Vessels, so that it may very commodiously be reduced into blood; neither truly doth there seem need of other or more passages. Moreover we determine that that humor rightly constituted doth agree with, and is easily assimilated to the mass of blood, as well as the Chyle it self made sweet, without any contention raised in the heart. But if the lymphatic humor returning from the Brain and nervous kind as well as from the Glandules, degenerate from its due temperature, and contract a sowrness (as it often comes to pass) then being re-infused into the venal blood it overcomes it, and precipitates it into serosities, and from thence great streamings of urine do ensue. Moreover we have shewed elsewhere, that the Diabetes is provoked from such a cause. But such a flux of the lymphatic humor is so far from exciting a greater boiling up of the blood in the right ventricle of the Heart, that rather on the contrary from thence often chilness of the whole or stifness, with a weak Pulse, and sometimes swoonings or convulsive fits are provoked, accompanied with a plentiful and pale urine. The reason whereof without doubt is, that then the clear humor flowing from the brain and nervous parts, turns the blood into serosities, and cools it by too much diluting; and for that cause the animal spirits being destitute of their vehicle, either faint or run into irregular motions.

Which seems not likely to be true.

Our opinion hereof.

The pneumonic circulation of the blood is stopt sometimes by the fault of the heart it self.

But truly as we altogether deny an Elastic effervescence of the blood in the right Ventricle of the Heart from contention of dissimular parts; so as often as from thence the blood is not cast out into the Lungs after a due manner, we determine it to happen not so much from the proper fault and defect of the blood it self as from the animal faculty. For if the spirits actuating the moving Fibres of the Heart, either grow weary, or are forced into convulsive disorders; for that cause the Heart beating in disorder, drives out before it the blood either infirmly or irregularly.

2. Sometimes by the fault of the blood.

3. Sometimes by reason of passages obstructed.

But that the blood issuing out of the Heart doth not always with expedition pass through the Pneumonic Arteries, that sometimes happens from its own proper fault, and also sometimes from the passages obstructed, and also by reason of other causes. The blood it self in a double respect hinders its own passage through the Lungs, *viz.* either offending as to its kindling, or as to its temperature. There are sundry accidents of either of these. For first, even as the blood is more or less kindled than is con-

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venient, it is hindred or obstructed in the pulmonary circuit: if at any time the watry, earthy, or fixt saline parts are predominant in the blood, the spirit and sulphur being consumed or brought low; by reason hereof its liquor being not well or less kindled by the nitrous air, is not easily rarified in the pulmonary passage, and scarce passes through them like a flame of its own accord, but it sticks still in its passages, heavy and muddy, and creates much trouble and labour to the Heart whersoever it is circulated. Hence as often as the blood is a little more plentifully forced into the *Præcordia* by the quicker motion of the whole body, or of its parts, the Heart and Lungs labour hard for its driving about, and that with the utmost endeavours. And in this case it is probable, that the blood carried more rapidly into the right Ventricle of the Heart, doth somewhat stagnate; because it cannot presently be carried into the passages obstructed before it. Moreover from this cause those grumous or fleshy concretions called the *Polypi* of the Heart sometimes seem to arise. Hence both in the Pica, Leucophlegmatie, Dropsie, and inveterate Scurvy from the quicker motion of the body arises difficult and painful breathing.

The blood hindred in the Lungs sometimes because not kindled enough;

2. Sometimes the blood is too much kindled, and breaking out almost into a flame, and being above measure expanded, it can scarce be contained in the pulmonary passages (which it very much blows up and extends) but endangers them to be inflamed or kindled; wherefore lest it should tarry longer in them, the *Præcordia* beat with most frequent and strong endeavours, that the blood so over-much kindled might be ventilated and circulated: for otherwise it being carried within the Lungs and inflaming them all over, would quickly destroy the vital function.

Sometimes too much.

Besides these things which concern the kindling of the blood, there are other faults as to its temperament or mixture, by reason of which it less freely or expeditely is conveyed through the pneumonic passages. For when its consistence is either too laxe or too close, it will not easily pass through the small passages of the Lungs; but oftentimes is in hazard to stick and stagnate in them, and also run out and be extravasated.

It is also stopt through its temperament being vitiated.

The blood being in a diverse manner made loose in its consistence, either deposites its Serum, or its dregs, or its putrefaction in the Lungs; which being lodged in the recesses of the Vessels, or affixed unto their sides, do variously stop or pervert the course of the blood.

1. The dissolution of blood, which is most commonly injurious to the Lungs, (although not very dangerously) is wont to happen, for as much as the serosities being unapt to be contained within the mass thereof, and when they are not presently sent away by sweating or urine, they separate from the blood within the Lungs; and so boiling up, and breaking out from their proper vessels, do as well disturb and stop the passage of air, as that of blood; so that for the sake of expelling those serosities and continuation of the circulation of blood, the Lungs are provoked into a frequent and very troublesom Cough. What the formal reason of this Cough is, and the manner of its being brought about, we shall declare hereafter.

When the blood is too much loosened in its consistence.

Though there are many causes and occasions, by which the serous liquor, departing from the loosned consistence of the blood, flows out abundantly into the Lungs; yet for the most part it happens from one of these three, *viz.* first and most frequently, because the Pores outwardly bound up by cold, cast back the serosities which were wont to be sent away by perspiration, into the mass of blood; which compel it presently to boil up, and cast off the serous superfluities in the Lungs. From this kind of cause Catarrhs and Coughs frequently arise, insomuch that the beginning of every cough by the vulgar is always imputed to such an occasion, to wit, catching cold. 2. The drinking of sharp and thin liquors, as Cider, Rhenish Wine, white Wine, *Paris* Claret commonly causes to some a Cough, or catarrhal distemper: the reason whereof is, for that the blood, weak in temperament, is presently dissolved and precipitated into serosities like milk by sowre things cast into it, which flow plentifully from the mouths of the inward Arteries. I have experimented this upon my self yearly, when in the Summer season (when the blood abounds with sulphur) I have drank Cider and tartish Wines safely, yea frequently to advantage, the same in winter (when the blood is prone to sowrenes) but moderately tasted of, do presently provoke a Cough. 3. There is another cause of this serous inundation flowing out upon the Lungs, *viz.* when the *Lympha* watering the nervous and solid parts, doth suddenly suffer a flux; and for that cause it streams back into the blood out of the Fibres and Glandules, and other passages and receptacles; whose liquour it presently dissolves, and precipitates into serosities, which often infests the Lungs.

Why it lodges the Serum in the Lungs.

The various causes and ways of doing it.

For this reason a sudden and troublesom Cough frequently accompanies convulsive distempers, which being commonly called a vaporous Cough is ascribed unto vapours. Moreover in great alterations of air, especially when the season varies from dry into moist,

moist, and the volatile and fixed salts do thereby melt, the Cough and Catarrhs increase very much.

Neither doth the serous liquor only, but also many other humors or recrements of the blood lodged in the Lungs frequently stuff up their passages; so that by obstructing both the passages of air and of blood, they cause difficult breathing or a cough. This is every where perceived in ill-habited bodies, also in Gluttons and Drunkards, and others leading an inordinate and sloathful life. Wherefore Foot-men use a thin and spare diet, that they may have their Lungs free from the filth and recrements of the blood. I have observed some melancholly persons, the adust *faces* abounding in the pulmonary passages, to have voided blackish spittle like ink; also others cholerick, and inclining to the Jaundice to void yellow, and sometimes very bitter, as if it had been meer choler.

The blood dissolved also lodges in the Lungs infections that cause corruption.

3. Moreover many instances manifestly declare, that sometimes the Lungs are tainted by the corruption and putrefaction of the blood. For the blood, toucht with an infection or a pestilent or venomous contagion, begins to be corrupted, and withdraw into clotted and corrupted portions; from thence the Lungs undergo the chief taint, from whence the greatest danger of life is threatned. This is too well known in the Measles, small Pox, Plague, and malignant Feavers, for me now to undertake to explicate it: by which maladies as often as the sick die, it seems to come to pass, either because the blood clodding in the vessels of the Heart or Lungs, obstructs the way of its proper course, so that presently its influx into the Brain is hindred, or because the corruption of the blood, affixt to the sides of the pulmonary passages, causes a Phlegmon as it were; and therefore provokes a most troublesom cough or difficult breathing, and frequently bloody spittle. So much for the impediments of the circulation of the blood, which happen in the Lungs by reason of the mass of blood too much dissolved, and apt to depart into parts and portions, (which being there left obstruct their passages.)

The blood is hindred in the Lungs by reason of the too thick consistence of the blood;

There remain other no less prejudices to the *Præcordia*, which proceed from the consistence of the blood too much bound up together, and sending nothing from it self: by which a burning Feaver, Plurisie, or Peripneumony arise.

As is perceived in a Feaver.

In the former distemper the blood being more sulphurous than it ought, and therewithal being thick, is not diluted enough with its Serum; and those particles of it contained within it self, it puts away with great difficulty: wherefore it is more plentifully kindled in the Lungs; and when it passes through the passages hereof with more difficulty, by reason of its greater boiling, and its thickness, the Heart beating quick and most vehemently, endeavours its circumpulsion with all its might; notwithstanding from its greater flame growing hot within the *Præcordia*, heat and a most troublesom thirst, with roughness, and as it were a certain parching of the tongue arises.

In a Pleurisie and Peripneumony.

In the other kind of distemper, *viz.* a Pleurisie and Peripneumony, the blood is alike thick, but less sulphuruous, and inflammable; wherefore it doth not participate of such a burning: yet by reason of its thickness it doth not so easily and quickly pass through the Chest or Lungs, is frequently extravasated, and sticking to the interspaces or sides of the passages, causes obstructions, and soon after an inflammation, to which pain often succeeds with bloody or discoloured spittle. We may observe in blood-letting in these kind of distempers, that after it hath settled, its superficies is covered with a little whitish Skin, or otherwise discoloured, but always with a thick and viscous: the reason whereof is, that the blood, when it doth not send away in the circulation its old particles, nor doth admit enough of new, it is thickned with a continual boiling, and like boiled flesh changed from a bloody colour into a whitish; in which state, passing with difficulty through the small passages of the vessels, it is in danger to be extravasated, and easily provokes a Pleurisie or Peripneumony.

The blood is hindred in the Lungs by the fault of the heart.

Besides these stoppages of the Blood, caused by its own fault, while it passes through the *Præcordium*, there are also other impediments, which happen either by the defect of the Heart, or its passages, or by the fault of the air inspired. By what means and for what cause the Heart offending in its motion, forces the blood from its right Ventricle through the Lungs into the left irregularly, we have clearly shewn in our late Tract of Cardiack Distempers: to wit, that muscle sometimes labouring for want of spirits doth not vigorously and strongly enough perform its beatings. For when in corporal exercise the blood more plentifully than usual, is forced from the *Vena cava* into the Ventricle of the Heart; if this cannot firmly contract it self, labouring according to its strength, it causes frequent and weak Pulses: moreover to help this as well the Pneumonic Arteries, as others in sundry parts of the body, which drive about the blood every way, do cause frequent and inordinate contraction. Thus I have observed in Virgins afflicted with the Green-sickness, and in other cachectical bodies, from a quick motion of the body, not only a palpitation of the Heart, but in the neck, temples, and other pla-

1. *When the spirits thereof are wanting.*

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ces the Arteries to have beaten irregularly. Neither is it the want of ſpirits only, but their diſorder is ſometimes the cauſe that the *Præcordium* doth with leſs ſtrength convey the blood; for ſometimes the ſpirits, the inmates of the Cardiacal nerves, being ſtirred up by an incongruous conjunction, and affected convulſively, do impreſs their irregular contractions upon the Heart or Arteries, whereby the progreſs of the blood is ſeveral ways perverted or hindred, as it often happens in Palpitation of the Heart, Trembling, intermitting Pulſe, and other the like paſſions.

2. Becauſe moved inordinately.

3. The Pneumonic proceſs of the blood is variouſly ſtopt, becauſe the paſſages are not open enough: which impediments happen often as the Pores of thoſe paſſages are either ſtopt or broken. Of the former there are two reaſons *viz.* ſometimes the ways are ſhut, for as much as the paſſages of the veſſels, contracted by the carneous fibres, are brought nearer one another; as we have elſewhere ſhewed, doth ſometimes happen in Palpitation of the Heart, and a convulſive Aſthma. The affects of which ſort, by reaſon of the ſtream of blood ſhut within the *Præcordia*, difficult or hard breathing, a ſmall Pulſe, and chilneſs of the whole body are wont to accompany. Moreover ſometimes the courſe of the blood is ſhut up, becauſe the paſſages of the veſſels are preſſed together by a body, or by ſome humor from without: wherefore when the little Cells or bronchial Pipes (as is uſual) are filled with a viſcous flegm, purulent matter, or blood extravaſated, as the free paſſage of the air is hindred in them, ſo alſo the paſſage of blood is ſtopt in the veſſels adjoyning. On the ſame account come tumors, little ſwellings, worms, alſo ſtony, ſandy, and curdly concretions, and others of another kind are in diverſe manners excited; the chief whereof we ſhall touch on hereafter. Moreover we ſometimes ſee the canals as well of an Artery as of the Pneumonic Vein, made very bony in ſome part, and their ſides ſo compreſſed, that a very ſmall chink remains for the blood to paſs. Not long ſince we diſſected a young man who died by reaſon of an ill formation of the Pneumonic Vein, in whom the Trunk of this veſſel growing ſtony near the juncture to the heart, did ſtick ſo cloſe, that the blood did drop into the heart only by drops, or by a very little ſtream. 2. That the paſſages bringing blood are often filled and ſtopt, inſomuch that the ſtream of blood is obſtructed or ſtraitned, many anotomical inſtances and obſervations manifeſtly declare. From thence it appears, that grumous, or as it were carnous concretions of the blood do frequently ſo ſtop the ventricles of the heart, and the roots of its larger veſſels, that the courſe of the ſtream of blood is almoſt entirely ſtopt. Moreover reaſon perſwades, and experience concludes this more frequently to happen in the leſſer veſſels: for ſeeing (as we have even now intimated) the blood emitted by Philebotomy in Rheumatiſms, Peripneumonies, and Pleuriſies, when it is cold is covered all over with a thin skin altogether of the like ſubſtance with thoſe concreted Polypus's; it plainly appears, that it paſſes with difficulty through the paſſages of the leſſer veſſels by reaſon of thoſe viſcous excrements: wherefore that it may paſs by ſome means, it diſtends them very much, and ſometimes breaks quite through them, alſo it frequently unlocks their mouths, and opens gapes into the *Trachea*, inſomuch that portions of the extravaſated blood are by coughing frequently ejected. We have known ſome to have died Aſthmatic or ſhort-winded, whoſe Lungs being free from an Ulcer, or any more grievous wound, have ſwelled ſo much, that they wanted room for their motion within the cavity of the Cheſt: the reaſon whereof doubtleſs was, that the thicker and more feculent blood, for that cauſe not eaſily paſſing through thoſe veſſels, every where extended the Arteries and Veins, and cauſed it to ſtagnate in the leſſer Pipes. Moreover the feculencies of blood one while ſalt of different kinds, another while ſulphureous or earthly being combined with them, and thruſt into the ſmall paſſages of the veſſels, and fixed there, do altogether obſtruct them; inſomuch that the Pneumonic circulation of the blood is contracted into a ſhorter ſpace, and conſequently the function of breathing is ſtraitned in the compreſſed Pipes or little Cells. There are many kinds and ſundry ways of ſuch an obſtruction, which if all or the chief ſhould be enumerated, ſuch a Pathology would ſwell into too great a bulk.

3. The blood is hindred from obſtruction of the paſſages. Which are ſhut up divers ways. For divers cauſes here rehearſed.

The bronchial Pipes are filled.

Sometimes wax hard.

The veſſels are ſtuffed with concretions reſembling the Polypus.

3. The Pneumonic paſſage of blood is not truly hindred by reaſon of the paſſages ſhut and obſtructed, but ſometimes alſo being burſt aſunder. For thoſe veſſels being ſmall, or tender, or very looſe in ſome perſons, are frequently opened by the force or acrimony of blood; ſo that the blood either burſting into the *Trachea*, is ejected by ſpitting, or heaped up in the interſpaces of the paſſages, cauſes Preripneumony, or falling down into the cavity of the Cheſt, produces an Empyema. Of all theſe we ſhall treat ſingly in the Chapter of ſpitting of blood.

The blood is alſo hindred becauſe the paſſages are burſt aſunder, as in ſpitting blood.

3. There remains as yet a third impediment of blood in the Pneumonic paſſages, which happens for the want or fault of Air. If at any time the blood is not kindled after a due manner within the paſſages of the Lungs, from air breathed in by the *Trachea*; for that cauſe as preſently its flame is irregular, ſo likewiſe its motion is variouſly ſtopt or perverted:

One impediment of the blood is want or default of air.

perverted: for although the blood is forced through the Lungs by the meer impulſe of the heart, notwithſtanding the Pulſe hereof is proportioned according to the tenour of its being kindled by the air; wherefore when the flame of blood is diminiſhed, or ſuppreſt, for want or through the fault of the air, preſently the Pulſe proves languid or unequal, and by reaſon of the bloods courſe being troubled, or ſtopt, preſently a paleneſs and coldneſs ſucceeds throughout the whole body, with enervation of the members. But if inſpiration be wholly intercepted or fruſtrated (becauſe the nitrous particles are wanting) preſently the pulſe ceaſes, and anon life is loſt. The reaſon of all which is, both becauſe the blood being much impeded in its aſcenſion, or extinct, like Muſt given over working preſently ſubſides, and is unapt for any motion; and chiefly becauſe the flame of the blood failing, and being ſubſtracted from the brain, preſently the Hypoſtaſis of the Animal Spirits, as it were light ſtreaming from thence, immediately fails, and together with it the exerciſe or actions of all faculties do ceaſe. But if the blood is too much kindled, the Sulphur of the Blood, and the Nitre of the Air running together more than it ought; for that cauſe preſently, that this too much burning may be eventilated enough, the Pulſe of the heart is increaſed to its utmoſt. We might adde many inſtances of this kind; but truly this conſideration of the blood leads us to the ſecond thing propoſed of Reſpiration hurt; namely that we may duly weigh, what ſort of failings or defects do happen about the inſpiration as well as exſpiration of the Nitrous air, requeſite for the preſerving the nitral flame of blood; that is to ſay from what cauſes they proceed, and alſo what effects they are wont to produce; in which ſearch we will firſt treat of Inſpiration hurt.

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Of Inſpiration hurt.

Breathing hurt by the vicious qualities or defect of air.

BReathing is accounted hurt, when its uſe is fruſtrated, or any ways hindred; which moſt frequently happens, by reaſon of the fault or defect of the Air drawn in. As to the former, if the Air chance to be depraved, it neither duely kindles nor eventilates the blood, yea it ſometimes overthrows the temperament thereof, or infects it, as is every where ſeen in a Conſtitution of Air very malignant. That we may touch on the chief reaſons of theſe diſtempers, we are to obſerve, That as the Nitrous particles of Air are chiefly neceſſary, (as is manifeſt by manifold experiment) for the preſervation of life; ſo frequently it happens that Nitre of the Air either to fail or be wholly wanting, or by particles of another kind to be ſo much muffled, or bound up, that they cannot enough exerciſe their vital power, or laſtly malignant or fatal Corpuſcles to be adjoyning thereunto. Firſt, the nitrous particles of Air are deficient, if when it ſtagnating or growing hot the Nitre is chaced thance, or not ſtirr'd into action. Wherefore, in a low-rooft Chamber, or too cloſe, and in other places crouded with aſſemblies of men, or made hot with the ardor of the Sun, we difficultly or weakly breathe. The ſame comes to paſs in places of great height, on the tops of thoſe Mountains exceeding the top of the *Atmoſphere*; wherein breath is faintly drawn for want of Nitre, neither can we live long there. Secondly, the Nitrous Particles of Air are wont to be obſcured or blunted by other acceſſories, alſo ſometimes they are too much ſharpened. For as often as the South-wind blows, the Air is too moiſt and thick, inaſmuch as the Nitrous particles are ſeiz'd upon by the watry and ſulphureous, and are much blunted, ſo that while it is drawn in, the blood is not vigorouſly kindled, but like green wood put into fire it rather ſmokes than burns bright; wherefore during ſuch a ſtate of Air we become ſtupid and dull, and unapt for motion; but on the contrary, the North-wind blowing, the cooling ſharp and moſt nipping Particles are adjoined to the Nitrous, and the blood is enough kindled, and we breath freely; yet the Vital flame is every where reſtrain'd by intenſe froſt diſportion'd thereunto, and unleſs refreſh'd by motion and heat, it is frequently and entirely extinguiſhed.

The faults of the air.

The defect of air hurting breathing proceeds from the Pneumonic Organs.

2- Beſides theſe faults of the Air, whereby breathing is wont to be hurt, moreover this evil ſometimes proceeds from its defect; inaſmuch as it cannot be drawn in plenty enough. Of which effects though there are many and divers cauſes, yet for the moſt part it happens in reſpect of the organs of breathing, either hindred as to their motion, or their paſſages obſtructed.

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1. The Organs of breathing are either meerly paſſive, *viz.* which are moved, as the Lungs; or are active, and move themſelves, and thoſe together, as the muſcles of the Cheſt and Diaphragma. In every of theſe the impediments of the motion by which breathing is hurt, happen variouſly. And firſt what reſpects the Lungs, we mentioned before, that they ſometimes very much ſwell, by reaſon of the Veſſels being much diſtended, and fill'd with blood, inſomuch as being ſtiff and inflexible, they obey not the turns of the Syſtole and Diaſtole of the Cheſt. Moreover it happens ſometimes through a Phlegmon, little ſwellings,and other concretions of divers forms, that a like ſtiffneſs is cauſed in them. Secondly, the active organs of breathing, or the moving parts, *viz.* the muſcles of the Cheſt and Diaphragma are wont to be perverted or ſtopt from their moving function by divers cauſes. A ſolution of continuity made in any part of theſe, either by clotting of blood, or by falling down of the *Serum*, and other humors, as in the Pleuriſie and Scurvy, or in thoſe that are wounded or bruiſed, doth every where cauſe pain in the place affected, with impotency of motion and difficult breathing. Moreover, ſometimes without pain, or any evident cauſe, thoſe parts being hindred from their motion do produce a moſt heavy purſineſs; As is frequently ſeen in an Aſthma, Suffocation of the Womb, and in certain other Convulſive or Hypochondriac diſtempers. The reaſon of which paſſion without doubt conſiſts in this, for that the animal ſpirits appointed to the moving function of thoſe parts, are diſturbed about their Origine, or hindered in the paſſages of the Nerves, and are turned aſide from their due influx into the moving fibres: Inſomuch as many who are ſound enough as to their Lungs, and only obnoxious to affects of the Brain and Nerves, are frequently ſurprized with horrid fits of an Aſthma, as we have at large declared in another place.

2. The ſtopping of air, hindering breathing, whereby it leſs freely enters the Lungs, frequently happens, by reaſon of the Conveyances, *viz.* the paſſages of the *Trachea* being ſhut, or not enough open. For indeed thoſe paſſages are wont to be ſtopt (as we have formerly obſerved touching the Veſſels bringing Blood) and prohibit the full entrance of air, when they are either obſtructed or compreſſed, or more narrowly contracted. Though there are many cauſes and ways whereby the paſſages of the *Trachea* are wont to be obſtructed, yet chiefly and moſt often a Catarrhal diſtillation of the *Serum*, while it departs from the blood, and flows out of the veſſels bringing blood into theſe parts; which being firſt thin and ſharp, produces a troubleſome Cough; afterwards thickning by digeſtion, and cleaving to the ſides of the *Trachea*, exceedingly ſtraitens the ways of inſpiration, and ſhortens them by quite ſtuffing up their extremities. In like manner the ſweating out of extravaſated blood, as alſo of *Pus* or ichorous matter out of the Lymphedu&cts or Veins into the tracheal little bladders, doth frequently produce an Aſthma, and often a Conſumption; the reaſon of which ſort of diſtempers ſhall be more largely explained hereafter. Secondly, it is manifeſt enough by common obſervation, that the Tracheal paſſages as well the laſt as the intermedial, often-times are ſtraitned, or ſhut, by compreſſion. For after a plentiful meal, or abundant drinking of Wine or ſtrong Ale (inaſmuch as the Pneumonick veſſels are very much diſtended by reaſon of the turgency of blood, and the ſides of the Trachea being preſs'd together, do not admit of a free and uſual entrance of air) men otherwiſe healthful enough, do breath difficultly and painfully: Which truly we eſteem to happen from the Lungs being filled and extended rather, than from a cram'd ſtomach hindering the Syſtole of the Diaphragma. Moreover, for this reaſon,even in the very paroxyſmes of feavers a frequent and painfull breathing is manifeſt. Neither onely from the turgency of blood,but alſo from the ſame ſtagnating,or extravaſated,and alſo from ſtony concretions,and divers other manners, the veſſels of the Trachea being preſſed together,cannot diſcharge a free breathing.

The various ways of Obſtructions.

A Catarrh.

The ſwelling of blood by which the paſſages are preſs'd together.

3. The paſſages of the Trachea being ſometimes more nearly contracted and cloſed from their fibres convulſively diſpoſed, deny a paſſage to the Air for due breathing. From hence, when there is no obſtruction, or ill conformation in the Lungs, as alſo no conſumptive diſpoſition, yet from thoſe fibres preternaturally convulſed and drawn together, dreadful fits of an Aſthma frequently ariſe. Whereas we have in another place diſcourſed of theſe paſſions, it will not be requiſite here again to repeat that diſcourſe. Beſides theſe accidents of breathing hurt, there are certain others which are ſtirr'd up by reaſon of the Air prohibited in its firſt entrance,*viz.* in the Noſtrils, the throat, the *Larynx*, from a tumour or ill conformation: For the *Polypus* in the Noſe, the Quinzy in the Throat,or inflammation of the Tonſils,do render a difficult breathing; in the ſame manner as a heap of ſand about a Haven, obſtructs the ingreſs and regreſs of Ships. But truly ſince the reaſons of thoſe paſſions, and their manner of being made, are expoſed to ſenſe, it ſeems ſuperfluous here to deliver their cauſes.

The Cramps of the tracheal paſſages.

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SECT. I. CHAP. IV.

Of Expiration hurt.

The act of expiration is easier than of inſpiration.

AS Expiration is much easier, and with leſſer trouble performed than Inſpiration, ſo it is leſs endangered to be ſtopt or perverted, as to its function: for in truth the contractive endeavours of fewer muſcles are required to perform that, inſomuch as ſome do affirm that the meer relaxations of the moving parts, whereby the dilatation of the breaſt is diſcharged, doth ſuffice for its conſtriction. Hence when in the agony of death, the ultimate labour is to open the breaſt, and fetch breath, by which the flame of life may be continued; as ſoon as that endeavour is become fruſtrate, the animal exſpires, and is readily extinct. But truly we have already clearly enough evinced, that the tasks of breathing out, no leſs than thoſe of breathing in, are performed by the help of peculiar muſcles. Wherefore, when it happens that the Organs of Exſpiration are either hurt or prejudiced, there muſt needs follow difficulty or depravation of that function. The moving parts, which bind together the breaſt, and ſtraiten the cavity thereof, are eſpecially the inward muſcles of the breaſt, ſome belonging to the Loyns, and others to the Abdomen; as alſo the muſcular fibres of the *Larynx* and *Trachea*; by reaſon of ſome faults, occupying ſometimes theſe, anon them, either ſingle or many together, exſpiration is wont to be ſtopt or perverted after a diverſe manner. Although the hurt of this function frequently depends upon inſpiration being prejudiced; notwithſtanding it ſometimes happens alone, ſo that when we ſuck in Air eaſily and duely enough, we return it diſturbed or perverſly, which truely is wont to come to paſs through divers cauſes, and after many manners (the chief of which we ſhall here briefly touch upon.)

Expiration hurt ſometimes proceeds from the fault of inſpiration.

Sometimes being alone depends on various cauſes.

1. For firſt, when a wound, or convulſive or paralytical diſtemper happens in one muſcle (which cauſes exſpiration) or in more, for that cauſe the cavity of the *Thorax* cannot be ſo freely drawn together and compreſs'd, for the more full breathing out air or breath. Hence not only ſuch as labour in a Pleuriſie, but in a tumour or wound in the intercoſtal muſcles or the Abdomen, cannot eaſily cough, or ſing, or perform other acts of ſtronger exſpiration: Neither is the due drawing together of the *Thorax* leſs ſtopt, by reaſon of the moving fibres of thoſe parts affected either by a reſolution, or a cramp.

1. On the wound of a part moving.

2. The act of exſpiration, whereas it is variouſly perverted or diſturbed, ſo it chiefly happens in a cough, in ſneezing, in laughing, in crying, and in Hiccough; into the reaſon and manner whereof we will briefly enquire; And firſt we ſhall ſpeak of a Cough.

2. In a Cough.

The deſcription of a Cough.

A Cough may be deſcribed, that it is a vehement, more frequent, unequal and loud exſpiration, ſtirred up either for the quieting of ſome troubleſome and provoking thing, or for expelling of it out of the Lungs through the paſſage of the *Trachea*. For air being violently excluded, and daſh'd in the way on the ſides of the Tracheal paſſages, whatſoever is in any place impacted in them, if it be eaſily moved, it diſcuſſes and wipes it away, and frequently ſends it out of doors.

Its formal reaſon, and the manner of its being done.

For the exciting of a Cough, both the muſcles contracting the *Thorax*, and alſo the moving Fibres of the *Bronchii*, do concur in motion with a joynt force together. For while the muſcles ſtraiten the cavity of the breaſt, and every where ſqueeze the whole Lungs; theſe fibres one while contracting theſe tracheal paſſages, another while them, cloſing behind the air while it is driven forwards, do endeavour its expulſion more quick and vehement.

A more intenſe ſudden inſpiration precedes every act of a Cough, to wit that the air being admitted in greater plenty, may preſently be more violently driven out with noiſe; in which endeavour not only the new that is freſh breathed in, but alſo the old, being heaped up before in the tracheal little bladders, is driven forth together with a noiſe, for the encreaſe of breath blown out; and when what is troubleſome is not ſettled nor removed at the firſt aſſault, the vehement exſpiration of this kind is repeated by a frequent courſe, even to the great wearying of Nature.

Its primary cauſe.

The firſt cauſe of every Cough is an irritation of the nerves or fibres belonging to the lungs; concerning the nerves we are to obſerve, that not only the branches and their ſlips inſerted into the Lungs, but others from which they do ariſe, or with which they do intimately communicate, being provok'd in places far diſtant from the breaſt immediately cauſe a cough: for which cauſe oftentimes a ſharp humour being lodged within

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within the Brain, and from thence falling down into the little head of the pectoral nerves, is wont to produce a moſt troubleſome Cough or Aſthumatick diſtempers, as not long ſince we have declared by notable inſtances. For the ſame reaſon a pain inflicted on the noſtrils, palate, or *Gula*, provokes a Cough, or rather a vain attempt of coughing. Moreover a little *Serum* diſtilling from the Arteries into the upper parts of the *Gula* or *Larynx* produces a frequent and very troubleſome Cough, without any notable prejudice of the Lungs. But truly this provocation, inflicted on the nerves and fibres diſtributed in the Lung it ſelf, more frequently, and truly more violently provokes an endeavour of Coughing, which is repeated by courſes, till what is troubleſome be turned forth, or the provocation reſtrained. Of this kind of Cough from the nerves, a notable Example ſhall be after ſet before you.

The evident cauſes thereof.

The provoking cauſes producing a Cough are manifold, and make their ſtay in ſeveral places: for beſides that the nerves, as we but now intimated, and alſo the membranes, with which there is an intimate communication with the Lungs, being provoked in the open Noſtril, give an impreſſion of that paſſion at a diſtance to the Lungs; moſt frequently that irregular exſpiration is ſtirr'd up, by reaſon ſome incongruous or in ſome meaſure unproportion'd thing is caſt into the Lungs. For in the firſt place, that this troubleſome thing may be removed, the nerves and the nervous fibres diſperſed about the Lungs are irritated; afterwards by the conſent of theſe, the muſcles of the breaſt that draw it together, and the moving fibres of the Trachea at once are forced into vehement and often repeated contractions.

The kinds thereof.

Every Cough is either moiſt or dry; in the former a cetain humour being depoſited in ſome place within the tracheal paſſages is ſhaked by coughing, and being to be thrown out upwards is caſt into the mouth. That humour, whereas it is manifold and after divers ſorts, for the moſt part it is either call'd ſerous, or nutritious, or purulent, or bloody.

A moiſt Cough.

Of the former there are many kinds and differences; namely, as to its conſiſtence it is either thin, or thick, or crude, or digeſted; as to its colour, it is either white or yellow, or ſomewhat greeniſh; alſo ſometimes it is blewiſh, or black. Moreover, a moiſt Cough is variouſly diſtinguiſhed, as to the places from whence the humour to be coughed out proceeds. For ſometimes cleaving to the ſides of the *Larynx*, or ſweating from them, the moving fibres being ſhaken by a gentle little Cough, it is eaſily and by a ſhort paſſage caſt forth into the mouth; ſometimes the matter to be excerned, being impacted a little deeper in the pipes of the *Bronchii*, is not ſhook out but by large exſpirations, and often repeated; and laſtly, it ſometimes happens that the excrements to be caſt out, are depoſited within the fartheſt little bladders of the Trachea, out of which it is not brought forth without a vehement labour of coughing, and that frequently repeated, and at laſt driven forth by a long journey through the whole Lungs. Concerning the Cough of a nutritious humour, as alſo of a bloody and purulent, hereafter it ſhall be diſcourſed when we treat of a Conſumption and its remedy.

A dry Cough.

A dry Cough, as often as it is the proper paſſion of the Lungs, is excited after many manners and by ſundry cauſes; for an obſtruction of any of the Pneumonic paſſages, whether it be by compreſſion, or oppletion, or contraction, doth neceſſarily induce this. Wherefore an inflammation, a tumour, a little ſwelling, a ſtagnation of the blood either through plenty or ſcarcity, alſo gravelly, ſtony, or polypoſe Concretions, worms and many other preternatural things, inaſmuch as they almoſt perpetually provoke the nervous fibres, do induce a dry, vain Cough, but very troubleſome. But a dry Cough ſometimes is ſtirr'd up by the inſtinct of Nature, as in place of a Pump; to wit, that the blood either by reaſon of its proper ill temperament, or by reaſon of the Pneumonic Veſſels not being open enough, not paſſing well through the Lungs, may be promoted by the ſhaking of theſe parts, and forced into a more rapid motion.

What belongs unto the other acts of exſpiration hurt, as when in ſneezing, hiccough, laughing, crying, and in other affects its natural and even function is troubled or perverted; ſeeing the rendrings of the cauſes of theſe (which alſo in another place we have in part deſigned) do not properly appertain to our purpoſe, omitting them here we will paſs to the thing chiefly deſigned, *viz.* to the diſeaſes of the breaſt and their remedies, and to the reaſons of curing them.

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SECT. I. CHAP. V.

Of a Phthiſis or Conſumption in general.

WHereas we have hitherto viewed the fabrick of the Lungs accurately delineated, and the motion thereof together with that of the whole Breaſt, and the ways and paſſages of the air, and of the blood, and of other humors through them; and have alſo obſerved their various impediments, their remora's, or diverſions, according to which its happens the act of the Pneumonic function is after a diverſe manner hurt or perverted in inſpiration and exſpiration: now in the next place we are to deſcend to the Pathology of this region ſo travelled over, and, which was our deſign from the beginning, to treat of Medicines belonging to the *Thorax*, or Remedies appropriated to heal the diſtempers of the Breaſt, and the manner of their operation.

A Phthiſis accounted chief among the diſeaſes of the breaſt.

Of all the diſeaſes of the Breaſt a Phthiſis, or Conſumption, by right claims the firſt place: for there is none more frequent or difficult to cure. Moreover all the other affects of the *Thorax* being ill, or not at all cured, do lead into this, as leſſer ſtreams into a greater Lake, and ſo ending in a Phthiſis, loſe both their natures and ancient names.

The various acceptation of Phthiſis.

But truly theſe terms of *Phthiſis* and *Tabes* in their proper ſignification denote an Atrophy, or a withering away of the ſolid parts with debility of ſtrength: the diſtempers of which ſort frequently proceed from a wound or Ulcer of the Lungs; notwithſtanding ſometimes without any fault of theſe, the extenuation or pining away of the whole body takes its riſe from the meer fault of the blood, or chiefly from the nervous juice. Therefore before we handle a private pulmonary Phthiſis, ſeems to our purpoſe to explain the general reaſons of this ſickneſs, and to declare how many ways, and from what cauſes the ill temperaments of the humors are wont to induce a privation of nouriſhment of the whole body, as it were conſumptive. For truly the Conſumption of the Lungs it ſelf doth not next and immediately proceed from an Ulcer or corruption of that bowel; but it ariſes for as much as the blood from them contracting a corruption, and highly defiled, for that very cauſe loſes altogether its nutritive virtue. Moreover as well this as the nervous liquor acquires ſuch an indiſpoſition. Of which in general we will now inquire.

It denotes any Atrophy.

An Atrophy firſt depends on the blood made unfit to nouriſh.

And firſt what relates to the Blood, we may often take notice, that ſome pine away without a Cough, or without any apparent fault either in the Lungs or Breaſt; in the mean time as to appetite, digeſtion, ſleep, and almoſt the œconomy of the whole natural and animal function do carry themſelves indifferent; notwithſtanding, as if nouriſhment ſhould be poured into a Receptable bored through, they are not nouriſhed, but pine away ſenſibly maugre all Dietetical Rules. The formal or conjunct reaſon of which kind of affect frequently conſiſts only in this, that the blood being notably depraved, cannot aſſimilate the nouriſhing juice continually mixt with it; wherefore it doth not only forthwith ſend it away, but alſo takes away ſome particles of the ſolid parts; which ſnatching to it ſelf, it preſently throws out, or caſts it into ſome place or other, or conſumes it by evaporation.

The depravations or degenerate ſtates of the blood, that are wont to induce an Atrophy, either conſiſt in its proper diſtemper, or themſelves are communicated from ſome other place, and indeed chiefly from the bowels, or from the nervous liquor being alſo degenerate.

The conſumptive Dyſcraſie of the blood either from it ſelf or communicated from other parts.

The proper Dyſcraſie of the blood it ſelf is twofold, according to which it happens, that the ſaline-acid particles or the ſulphureous and moſt ſharp are exalted above meaſure, and predominate over the reſt. For ſometimes the blood withdraws it ſelf from its genuine diſpoſition, *viz.* a ſweet and volatile into an acid, as is always found in ſcorbutical, melancholy, or cachectical perſons. Wherefore the nutritious juice being ever mingled with the bloody maſs, ſeeing it cannot for that reaſon be aſſimilated, and affixed to the ſolid parts, is releaſed again in a ſhort time; and is either forthwith ſent away by Urine, Sweat, or a Diarrhœa; or being pen'd up within the fleſh or cavities of the bowels, brings a Dropſie: of which ſort of diſtempers, being led forth into an evil ſtate, the ordinary effect is wont to be, that when ſome parts do ſwell very much, other parts are very much extenuated. Here it would be far from our purpoſe to deliver the true cauſe of the above-mentioned affects, and to put our ſickle not only into another mans harveſt, but alſo one far remote. 2. Moreover there is another ſtate of blood unfit for nouriſhment quite contrary to this, to wit, when being above meaſure hot and ſul-

1. The kinds of the former are reckoned up.

phureous,

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phureous, and from thence always violently burning out, it conſumes the nutritious juice by its effervescence and raging, and cauſes it too much to evaporate; ſo that the ſolid parts being defrauded of their proviſion pine away. The perſons obnoxious to this diſtemper have large veſſels, and much diſtended with blood, but their fleſh withered and hardned by heat. Though perſons ſo affected ſeldom pine away to death, yet they grow old ſooner, and end their life in a ſhorter ſpace.

This proceeds ſometimes from a fault of the bowels or ſolid parts;

2. The blood not only from its proper *indoles*, but alſo by reaſon of a Conſumption elſewhere, and chiefly communicated from the bowels and nervous juice, is often unfit to nouriſh. And firſt this frequently happens by fault of the bowels; for theſe being ill-affected, ſometimes do not duly digeſt the Chyme to be conveyed over to the blood; alſo oftentimes they pervert and defile it with their extraneous and heterogene ferments, inſomuch that the functions are fruſtrated in the faculties of breeding good blood and nouriſhment. Moreover ſometimes by reaſon of the Veſſels bringing the Chyle obſtructed within them, though much be eaten, yet little or leſs than due, is conveyed into the bloody maſs. Alſo in the bowels of concoction ſometimes Tumors, Impoſthumes, and Ulcers happen; from whoſe corruption the blood being infected in its paſſage, contaminates the reſt of the maſs, and renders it unapt to the work of nouriſhing. How often do we ſee from a Schirrus happening in the Spleen, Liver, Pancreas, or Meſentery, or by an Ulcer or cancrous Tumour of ſome Gut, as alſo of a Kidney, Womb, or Bladder, or otherwiſe malignant Sore, a deadly Atrophy to have ſucceeded without any notable fault of the Breaſt or Lungs? Yea Tumors, Impoſthumes, or cancrous and ſtrumous Ulcers happening in the outward parts, and eſpecially in the Back, do frequently end in a pernicious Conſumption. The reaſon whereof is plain, *viz.* in as much as in ſuch diſtempers both great plenty of the nutritious juice brought to the affected part through the Arteries, is either entirely beſtowed in the ſame place, or from thence is poured fourth abroad, inſomuch that all the other parts of the whole body are defrauded of their due proviſion; as alſo that the virulent or very incongruous matter there engendered and lodged is ſwallowed up again by the Veins, which defiles the blood by an impure black gore, and from thence renders it altogether unapt to diſcharge the faculty of nouriſhing.

Or from the nervous juice.

Neither only from the bowels and ſolid parts, but alſo from the nervous juice the ſtain (by which it becomes unfit to nouriſh) is frequently communicated to the blood. For when this liquor degenerates from its genuine temper, to wit, ſweet and volatil into an acid, preſently flowing out of the fibres and nervous parts, flowing back into the blood, it doth precipitate the liquor thereof, and compels it into fluxes, whereby all the nutritive matter is caſt forth, and one while poured forth by Urine or Sweat, another while by Vomit or Looſneſs. The reaſons of all theſe, and how they come to paſs we have explicated in a late Treatiſe.

The nervous juice ſometimes of it ſelf is chiefly the cauſe of an Atrophy.

But the nervous liquor, ſometimes by it ſelf, departing from its good temper, and being vitiated in its temperament, is a cauſe of want of nouriſhment, which alſo happens to be made in a twofold reſpect, or two manner of ways. For ſometimes that Juice being very much vitiated and degenerate, proves as it were vappid and decayed; ſo that it doth not actuate enough the fibres as well nervous as carnous, and inlighten them with an animal ſpirit: wherefore as the motive virtue, ſo alſo the nutritive fails in the ſolid parts. From hence either the entire body, or certain members and parts thereof being for ſome while affected with a Palſie, at length they wither away: as we have at large declared the reaſon thereof in another place. 2. We have alſo obſerved, that many labouring with a ſlow Feavour (or as called by us a nervous) do preſently languiſh, and in a ſhort time become much emaciated. In either caſe the ſame reaſon ought to be aſſigned; for, as is ſhewed in another place, ſeeing the animal ſpirits, together with the nervous liquor, their vehicle (which is as it were the maſculine ſeed) do actuate the nutritive humour every where collected by the ſolid parts even as the feminine ſeed, and render it as it were pregnant with a nutritive faculty; for that cauſe if that nervous liquor becomes either depraved or vappid, the bulk of the ſolid parts pines away as if it were made barren.

Two chief kinds of Atrophies.

So much of theſe things touching an Atrophy, or waxing lean, and the formal reaſons thereof, the cauſes and various manners of its coming to paſs in general. Of this diſeaſe as there are many Kinds and differences, ſo two chiefly and more obſervably occur, where-

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of either will deſerve a particular conſideration; *viz. Tabes* or *Phthiſis Dorſalis* comuonly ſo called, and a Conſumption of the Lungs. This latter, which properly belongs to this place, ſhall be diſcuſſed in the following Chapter; in the mean time concerning that (becauſe the knowledge thereof doth illuſtrate the Pathology of this (we ſhall ſpeak in a word.

Two kinds.

Tabes Dorſalis, although it hath almoſt loſt its name in this our Age, or perhaps changed it into a Gonorhœa, yet *Hippocrates* makes mention of it, and handling it avowedly,

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avowedly, he aſſigned a twofold kind thereof, *viz.* one from immoderate Venery, and the other from a deſtillation into the Spine of the Back. What relates to the latter, I have often obſerved ſome to be moſt grievouſly vexed with a pain about their Loyns, yea ſometimes in the whole Back, which when for ſome time ſome have ſo laboured under, they afterwards come to be lame or crooked, and at laſt fall away in the whole body, all but the head. The cauſe of which diſeaſe doubtleſs conſiſts in this, *viz.* firſt a humour or a certain incongruous morbific matter, deſcending with the nervous juice through the ſpinal marrow, did run into the branches of the vertebral Nerves, and therefore from the beginning, by reaſon of the Fibres being twitched, a continual pain almoſt did ariſe; afterwards by reaſon of ſome Fibres being reſolved, the oppoſite ones more vehemently contracted diſtort certain Vertebra's of the Spine; and laſtly ſeeing the animal Spirits cannot actuate enough the Nerves and Fibres belonging to the trunk and members, by reaſon of the nouriſhment fruſtrated, the withering of the entire body ſucceeds. Surely when the nervous liquor and animal ſpirits paſs not fully and freely out of the Dorſal Spine into the whole body, from thence oftentimes a pining doth ariſe: hence Impoſthumes and Ulcers ariſe about the Loins or the *Os ſacrum*, which in as much as they conſume or pour fourth the nervous liquor too much, cauſe an Atrophy in the whole, or at leaſt in the lower parts.

From the nervous juice ſtopt or depraved in the loyns.

2. Another kind of *Tabes Dorſalis* far more frequent, is alſo twofold: *viz.* it either ariſeth from the great or too-often loſs of the genital humor, or from a continual corrupt flux from the genital parts.

From the expenſe of the humour through the genital parts.

1. As to the firſt, it is manifeſt by vulgar obſervation, that the immoderate uſe of Venery, yea involuntary efflux of the ſeed, if it be either great or continual, produce a faintneſs in the whole body, and at length a pining away. The reaſon of this (as we have intimated in another place) is not, that the ſeed, according to the opinion of ſome, deſcends from the Brain through the Nerves into the ſpermatic bodies, and from thence, by reaſon of a great loſs thereof firſt the Brain, and then the parts, all depending on the influence of the Spirits ſpringing from thence, become infirm and pine away. But ſeeing we have ſufficiently evinced, that the ſeminal matter is immediately ſupplied out of the maſs of blood into the genital parts, and that it is altogether the ſame with that out of which the animal Spirits inſtilled into the Brain are procreated, it will neceſſarily follow by how much the greater portion is got to the Teſticles for repairing the loſs of ſeed, by ſo much is the Brain defrauded of its due ſhare, and therefore at length the function in the whole body, as well motive as nutritive, doth waver and diminiſh. Our furious Whoremongers are ſenſible of a great debility about their Loins, and the parts placed below them, to wit, the Thighs and Legs do chiefly wither away; the reaſon is, becauſe as well the proviſion of the animal Spirits in its firſt ſpring, *viz.* in the Brain failing, the outmoſt channels, *viz.* the ends of the ſpinal marrow, and the Nerves ſpringing from it, do ſuffer firſt and chiefly for this defect; and moreover becauſe near the Loins the Arterious blood gives out to the Teſticles more excellent particles and chiefly reſtaurative, being deſtined to nouriſh the Back, and in the mean time the venous blood being for that cauſe decayed or conſumed, is enfeebled, and ſteals from the Loins as much as poſſibly may be.

That humour is firſt either ſeed, a too great expence whereof induces an Atrophy.

The loſs of the ſeed cauſing a Conſumption is ſometimes voluntary, of which ſort the ſalacious and prone to Venery do ſuffer: ſometimes involuntary; of which affects there are divers kinds. For in ſome it only happens by dreams or obſcene phantaſms; but in others, beſides thoſe occaſions, every endeavour of the Back, whether through bearing a weight, or excretion of Urine, or the *faeces* of the Belly, cauſes the genital humor to be thruſt out: the cauſe whereof is, both becauſe the ſeed is watry and thin, and at once ſharp and provocative, alſo becauſe the parts are weak, and not able duly to digeſt or retain it.

The loſſes whereof are voluntary or involuntary.

In the other *Tabes Dorſalis* above-mentioned, not the ſeed it ſelf, but an ichor or a certain putrilage is caſt out abundantly from the genital parts; the efflux whereof, if it be great and continual, doth frequently impair the ſtrength of the whole body, and by withdrawing and prodigally removing the nutritive matter, it induces an Atrophy or Conſumption. For near the ſpermatick Veſſels, or in paſſage from them, as well in men as women, there are certain Emunctories placed, whoſe faculty is to receive the ſuperfluous humour from the ſeed formed, and when it abounds to ſend it abroad through the genital parts. For this cauſe that thoſe paſſages in either Sex may be made ſlippery and moiſt (leſt they grow dry, and become leſs ſenſible) the Proſtates in men and the Glandules about the horns of the Womb in women are conſtituted: out of both which always in the act of coition, and ſometimes without, when the ſpermatic bodies abound with too much moiſture, a certain ſerous liquor ſweats out: and in women (whoſe bodies are more moiſt, and in whom Nature hath made theſe ways for their menſtrual

2. Or Ichor flowing into thoſe parts from ſolution of continuity.

The formal reaſon of a virulent Gonorrhea.

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menſtrual excretion) this doth oftner and more plentifully happen than to men. But if theſe Emunctories be affected with a great debility, or a certain virulency, ſo that they corrupt this liquor ſent, or do not retain it enough, it is not only ſent away inceſſantly, and flows out plentifully through the *Pudendum*, but alſo other ſuperfluous humours or recrements of the whole body flowing together to thoſe weak parts are thrown forth together. Alſo the nutritious Juice deſtined to the neighbouring parts flows thither, and preſently goes out together; ſo that at length by reaſon of the loſs of the nutritious Juice (which flowing to the ſame place is corrupted and continually ſent away) not only pains of the neighbouring parts, but of the whole body, and a pining doth ſucceed. Theſe things are commonly known in a Gonorrhœa, alſo in *fluore muliebri*, or thoſe affects from an impure bed, or immoderate Venery, or are cauſed by a blow, a bruiſe, violent exerciſe, or any other hurt inflicted upon the Loins. It is not proper to this place to deliver particularly the true rendring of the cauſe and curatory method of healing of this ſort of paſſions: we ſhall proceed to treat of a *Phthiſis* or *Tabes* properly ſo called, *viz.* which ariſes from the only or chief fault of the Lungs, which was the buſineſs of our deſign.

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Of a Phthiſis properly ſo called, or of a Conſumption ariſing by fault of the Lungs.

A Conſumption doth ſo frequently and uſually proceed from the Lungs being depraved, that ſome have termed it the peculiar Diſeaſe of this Bowel: and that it very often ſo comes to paſs, the reaſon is; becauſe (as we have ſhewed before) the pining of the body doth for the moſt part more immediately proceed from the blood depraved and unapt for nouriſhment, it is manifeſt, that as its perfection is acquired in the Lungs, ſo from theſe being ill-affected the ſame is moſt of all vitiated, and degenerates into a languiſhing and corruptible ſtate. For in the Lungs rather than in the Heart or Brain, the threads of life are ſpun, and there they are oftneſt defiled or broken.

The definition of a Phthiſis.

A Phthiſis is uſually defined to be A pining away of the whole body, taking its riſe from an Ulcer in the Lungs. But leſs true: becauſe I have opened the dead bodies of many that have died of this diſeaſe, in whom the Lungs were free from any Ulcer, yet they were ſet about with little ſwellings, or ſtones, or ſandy matter throughout the whole: for from thence the blood, becauſe it could neither be freely circulated in the *Præcordium*, nor animated enough by the nitrous air, and when in the mean time it is perpetually polluted by its proper dregs depoſited in the Lungs, is frequently vitiated and made incapable of nouriſhing thereby: wherefore a *Phthiſis* is better defined, *That it is a withering away of the whole body ariſing from an ill formation of the Lungs.*

The cauſe aſſigned by the Ancients.

The Ancients following *Hippocrates*, for the moſt part have aſſigned only two cauſes of this diſeaſe, *viz.* a *Catarrh*, and *the breaking of a Vein*, to which ſome have added an *Empyema*: and others exclude a Catarrh from this number: for what is vulgarly affirmed, that flegm falling from the Head into the Lungs, and abiding there putrifies, is moſt commonly the cauſe of a Phthiſis, or is often brought by it, we have formerly intimated to be altogether erroneous, and ſhall preſently ſhew it more clearly.

What the conſumptive matter is.

In the mean time to ſhew what the matter is that generates a Conſumption as often as it ariſes without an Empyema or Hæmoptoe going before, it muſt be conſidered after how many manners and by what ways any thing diſagreeable or Heterogene can enter into the Lungs; which diligent ſearch being made, it will eaſily appear, that any thing that is an enemy to the Lungs creeps in and is admitted chiefly either by the *Trachea* or by the Pneumonic Arteries, yea and ſometimes haply by the Nerves, but nothing by the Veins or Lympheducts, whoſe function is only to carry back or away the blood or Lympha, and to leave there nothing at all.

By what ways it enters the Lungs.

Sometimes by the Trachea, yet not deſtilling from the head.

As to the *Trachea*, it is manifeſt it is ordained for this end, that by its paſſages or pipes the air might be conveyed in or preſently carried back by a conſtant recourſe from whence it comes; moreover, whether any matter being hurtful or mortal to the *Præcordia* may be admitted the ſame way, ſhall be now our preſent diſquiſition. And that the Lungs frequently incur a pernicious pollution by this entrance is clear from hence

hence becauſe the moiſt air, of ſome regions, repleat with fumes, or abounding with malignant vapours, doth frequently induce the conſumptive inclination; nevertheleſs the affection thereof is wont to be communicated only by aerial minute particles (whereby either the temperament of the blood or the conformation of the Lungs or both are prejudiced.) But whether beſides this a ſerous matter or ſome humor corrupting the Lungs doth enter them through this paſſage, is not without reaſon doubted: though many do determine a Catarrh or a diſtillation of the Serum from the Brain into the Lungs by the paſſages of the *Trachea*, the principal cauſe of a Phthiſis. Which opinion being erroneouſly delivered by the Ancients, I admire any either of our modern Phyſicians or Philoſophers have admitted thereof; for it is manifeſt by anatomical obſervations, that nothing from the Brain by the *Glandula pituitaria* (which ſeems the only paſſage from thence) falls down into the Palate or Breaſt, but that the Serum there depoſited is conveyed by appropriate paſſages to the jugular Veins, and is remanded to the blood. Moreover it is manifeſt to ſight, that whatſoever relique of Serum is laid aſide in the Glandules of the Ears, Mouth, Noſe, or Face, is conveyed from them all by peculiar paſſages, inſomuch that no humor whatſoever deſtils from the Brain or the Palate into the Lungs.

But although matter exciting a Cough doth not deſtil from the Head by the *Trachea* into the Lungs, yet ſometimes falling down from the ſides of the *Trachea* into their Cavities, it produces that Diſeaſe commonly called a Catarrh. For the *Aſpera Arteria*, like the Arteries bringing blood, are endued with a nervous and muſculous Coat, and ſo do occaſionally enjoy ſenſe and motion, having alſo a glandulous Coat and full of little veſſels to ſuſtain the vital heat and nouriſhment. Theſe laſt Coats make thoſe interſpaces, and as it were cover the Cartilages. Moreover the ſuperfluous ſeroſities proceeding from the blood watering the *Trachea* are depoſited into this glandulous Coat, which for the moſt part preſently ſweating into the Cavities of the *Trachea*, ſerves chiefly to make them ſlippery and moiſt. But if the maſs of blood be poured out too much, and precipitated into ſeroſities (as it frequently happens, a cold being taken, or the ſwallowing down of acid things, and on many other occaſions) for this cauſe a great plenty of watry matter ſweats out of the Glandules of the *Trachea* and mouths of the little Arteries into its Cavities, which ſoon doth cauſe a moſt troubleſom Cough, and often much ſpittle (which afterwards comes to be conſumptive.)

But ſweating out of the ſides of the Trachea.

But ſurely this cauſe of Spittle and as it were a Catarrhal Cough very rarely comes alone, becauſe while the blood watering the *Trachea* having ſuffered ſolution, throws in its ſeroſities into the Glandules (whence preſently they ſweat into its Cavities) and alſo the remaining blood being in like ſort diſſolved, it inſinuates its *Serum* ſet apart within the Pneumonic Arteries, partly into the Tracheal hollowneſſes, and partly into the Lympheducts, by the overflowing whereof the Lungs are as it were overwhelmed and much incited, for the moſt part provok'd to Cough and continual ſpitting. A Cough and ſpitting of this kind as long as moderate, only throwing off the ſeroſities of the blood, rather are beneficial than prejudicial; becauſe the maſs of blood, and the very Lungs being throughly purged after this ſort, thoſe ſymptoms for the moſt part ſpontaneouſly abate, and from thence enſues a more perfect health. But if they be protracted a long time, the ſerous humour being on both ſides laid aſide into the tracheal paſſages, and from thence more plentifully daily heapt up, at length it will change into corruption; becauſe as well the free enjoyment of air is impeded, as alſo the motion of the blood, and its temperature wholly perverted; from hence a Cough becomes more fierce, and breathing more difficult; nay rather the whole maſs of blood in as much as it is defiled by the foul blood (which the Veins receive from the Lungs) degenerating by degrees from its benign properties, and being depraved, it not only continually pours forth the ſuperfluous Serum, but alſo the nutritive Juice (which it cannot aſſimilate) out of the Pneumonic Arteries into the tracheal paſſages; and ſo this maſs of conſumptive matter is daily increaſed, till the Lungs being more and more obſtructed and filled, and the blood being defiled, and rendred unfit to perform any of its functions, the Cough and Spittle become worſe and worſe, and preſently become dangerous; Moreover breathing being hurt, the faintneſs and pining away of the whole body, the debility of all the functions, and at length a hectick feaver, and a haſty declination to death follows.

The conſumptive matter brought into the Lungs rather by the pneumonic Arteries.

A Cough and ſpitting ſometimes healthful.

Yet often being too much is dangerous.

When by the long continuance of a Cough and Spitting, lea ſurely encreaſing, the humour is more plentifully depoſited out of the maſs of blood into the Lungs, it firſt of all enters into the tracheal little bladders, and at length fills them, and ſomewhat diſtends them, from which while every morning by expectoration thence more copiouſly performed, it is almoſt entirely caſt out from them, thence the *Thorax* is exempt for a ſhort ſpace from the burden, and reſpiration ſeems more free, yet a little afterwards

Why the Conſumptive matter affects, and by degrees hurts the lungs.

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afterwards the blood being ſtuff'd again with *Serum* or nutritive juice, it pours down new matter into the Lungs; and from thence again after meat or ſleep the little bladders are fill'd, and the humors by the afflux daily encreaſed, are more diſtended and enlarged, and at length the ſides of two or more of the little bladders, being burſt, many little bladders are here and there framed as it were into one lake, within which the conſumptive matter being more abundantly collected, there it putrifies (for it is not entirely preſently caſt out) and from thence it corrupts the ſubſtance of the Lungs, to which it is joined, and imparts a putrid defilement to the blood paſſing through it. This breach thus made in the Lungs is daily encreaſed, and frequently more are at the ſame time formed in divers places, and by reaſon of the great plenty of humours heaped up and putrified in them, a heavineſs of the breaſt is felt, like a weighty burden upon them, the breathing is more hindred; moreover from the tabid blood being more plentifully intermix'd with the maſs of blood, frequent effervеſcencies of it, deſtruction of the nutritive juice, alſo thirſt, heat, loſs of appetite, nightly ſweats, and a pining of the whole body do ariſe. But the blood being polluted from the Lungs, cauſes them to be puniſhed with a reciprocal affection, that is to ſay from its peculiar pollution; becauſe the blood in the veins receiving this purulent matter in every circuit, it immediately delivers it into the arterial; from whence, whereas it cannot be ſent enough away by ſweat, or by Urine, it is brought back by the Pneumonic arteries to the Lungs, where again being ſeparated from the blood, it is every where conveyed as well into the little bladders of the Trachea as into the leſſer paſſages; inſomuch, that at length the whole frame of the Lungs being filled, clefts or ulcers are formed conſequently in many places, and all the other hollowneſſes are ſtufft with frothy quitter.

How an Ulcer of the Lungs is made.

But ſometimes it happens that there is one Ulcer or hole, or happily two formed in the Lungs, and the ſides grow callous round about, ſo that the matter being there gathered together is not conveyed into the maſs of blood, but is daily expectorated though in a vaſt plenty. They that are ſo affected, as if they had but an iſſue in the Lungs, although they caſt up much Spittle, and thick and yellow matter every morning, and a little ſomtimes all day, yet otherwiſe they live well enough in health, they breath, eat and ſleep well, are well in fleſh, or at leaſt remain in an indifferent habit of body, and frequently arrive to old age: inſomuch that ſome are ſaid to have been conſumptive thirty or forty years, and to have prolonged the diſeaſe even unto the term of their life (for that cauſe not being ſhortened.) And in the mean time others who cough or ſpit leſs, within a few months fall into a hectick feaver, and in a ſhort while are hurried into their grave.

An ulcer of the lungs covered with a callous leſs prejudicial.

Hitherto touching the conjunct cauſe and formal reaſon of a Phthiſis or pulmonary Conſumption; what belongs to the other cauſes (that is to ſay, procatarctic and evident ones) they truly are various and manifold, inaſmuch namely as they are more near or more remote, inward or outward, and laſtly connatural or adventitious; That I may undertake to deſign the powers, operations, and modes of effecting of all theſe in producing a Phthiſis; primarily it is requiſite that I ſhew, by how many modes, and by reaſon of what occaſions the ſerous humour or (as folks commonly ſay) the Catarrhal, is laid apart out of the maſs of blood into the little Bladders of the Lungs, and into other Paſſages of the Trachea. Upon diligent ſearch of this it is obvious to any one to perceive the morbific cauſe conſiſts of two parts, and that the fault is in the ill temper of the blood ſending an offending matter to the *Thorax*, and alſo the weakneſs for ill tone of the Lungs eaſily receiving it.

The evident cauſes of a conſumption.

The primary cauſes of a Conſumption ſome from the blood, others in part from the lungs.

As to the former, it is manifeſt enough by common obſervation, that the maſs of blood being ſtuft with incongruous particles, *viz.* its proper ones degenerated, or with others from other places intermingled, doth boyl up for the expurging of them, and what is to be ſeparated, when it is not eaſily ſent away by any other ways, it is ſpread abroad into the Lungs, (if they are of a weaker conſtitution) and cleaves to them.

The ill temper of the blood diſpoſes to it.

There are many dyſcracies of the blood, and thoſe of divers kinds and affections, by which its liquor being diſſolv'd in its conſiſtence, and as it were curdled, doth not rightly contain the ſerous and nutritive juice within it ſelf; moreover ſending away theſe and other excrementitious humours unceſſantly from it ſelf, as ſometimes it depoſits them among other parts, ſo more often into the Lungs.

1. The blood ſometimes like Milk grown ſour of it ſelf, is depraved by little and little, and at length departing from its genuine faculty into a ſourneſs, and being diſſolv'd in its exiſtence, doth caſt abroad its ſeroſities (too eaſily prone to ſeparate themſelves) out of the Pneumonic and alſo Tracheal Arteries into the Tracheal paſſages. Thus to ſome it is ordinary once or twice in a year, without any manifeſt cauſe to be afflicted with a grievous and troubleſome Cough, with copious ſpitting, which

which in a certain proceſs of time (after the blood purged from its dregs and excrements recovers its temperature) doth ſpontaneouſly abate, and after doth ſucceed a more firm and durable health. By reaſon of ſuch a Cough ſerving for a purge to the blood, I have known ſome often in a day, and eſpecially every morning, who were wont to ſpit out ſpittle like black Ink, with a ſmall endeavour of the Trachea; which diſtemper when for many months they had conſtantly labour'd under, after a greater Cough occaſionally contracted, with much and yellow ſpittle, they have afterwards eſcaped altogether free from that former black ſpittle; the reaſon whereof is, that a heavier Cough abiding with plentiful ſpitting for ſeveral days, altogether purges away thoſe melancholy fœculencies from the blood, and moreover it alters the temperament of the blood, or rather takes away the ill temperament thereof.

And ſometimes it receives a conſumptive taint from the nervous juice.

2. The nervous juice being frequently degenerated, and with an abundant lympha returning back out of the fibres and nervous parts into the blood, as it produces ill affects of the bowels, and of the reins (whereof in another place we have hinted) ſo ſometimes it cauſes a fierce and very troubleſome Cough. This kind of Cough one while is Catarrhal, inaſmuch as the Lympha having paſs'd through the maſs of blood, is depoſited in the Lungs by the Arteries; another while it is convulſive, inaſmuch as the Nerves and Fibres, conſtituted to move the breaſt, are poſſeſt by that liquor, and are provok'd into convulſive motions: from either cauſe either conjunct or ſeparately it comes to paſs, that more grievous paſſions of the brain and nervous kind frequently call on a troubleſome Cough, or are wholly changed into it.

And ſometimes by reaſon of a fault communicated from the Lympheducts.

3. Beſides the faults of the blood and nervous juice, frequently exciting a Cough, it is probable that it ſometimes ariſes from the Lympheducts being obſtructed, which belong unto the Lungs: for whereas very many Veſſels of this kind are ſpread abroad through the Lungs, whoſe function it is to receive whatſoever is ſuperfluous of the Lympha that is carryed through the Arteries into the *Præcordia*, and not immediately brought back by the veins, and to convey it to the trunk of the paſſage of the *Thorax*; if by chance it happens that theſe paſſages are ſtopt, or obſtructed by viſcous matter, or compreſs'd or thickned by cold ſhould not well diſcharge their duty, it muſt needs be that thoſe watery excrements ſhut out from their wonted ſluces, or whirling back into the blood, do incite its fierce boyling up, or being poured into the paſſages of the Trachea, do ſtir up a Cough.

The fourth reaſon is uſual evacuations ſuppreſſed.

4. Neither do the humors above-mentioned only, in as much as they either pervert or hinder the craſis or motion of the blood, induce a Cough (which frequently is the beginning of a Phthiſis;) but moreover any uſual or wonted Evacuations ſupreſſed, or let, do uſually impreſs a fault upon the Lungs. The menſtrous flux or the Hæmorrhoids obſtructed, often bleeding at the Noſe if by chance it ceaſes, Iſſues cloſed up, Puſtles, Scabs and Wheals driven back, do frequently affix a taint in the *Thorax*. If a plentiful ſpitting from the Glandules of the Mouth ſtops of its own accord, or be cured by Medicine, afterwards ſometimes a Conſumptive Cough ſucceeds; wherefore the ſame is vulgarly called a Rheum, which had lately fallen from the Head into the Jaws and Throat, and thence diſtilled deeper into the Lungs; when indeed it is nothing elſe but a certain ſuperfluous ſeroſity of blood, that being uſed to be put aſide by the ephalic Arteries into the Glandules of the Mouth, now being excluded thence, is hurried through the Pneumonic Arteries into the Lungs.

By reaſon of tranſpiration hindred.

Beſides theſe private and periodical, or extraordinary evacuations, whoſe ſuppreſſions incline to a Cough and Phthiſis, there occurs another general and conſtant Evacuation *viz.* inſenſible tranſpiration; which being either ſtopt or ſuppreſſed, is oftner the occaſion or parent of that evil than all the reſt. For the ſteams that uſually evaporate by the Pores of the skin being reſtrained within, ferment the blood, and ſoon pervert it, and cauſe it to be precipated into ſeroſities; which with other excrements of the maſs of Blood being immediately laid aſide in the Lungs, do ſtir up a troubleſom Cough and often a Conſumptive one. Hence it is a common obſervation, that the catching of a cold, by which the Pores are ſtopt, whether it be by blowing of cold air, or being wet by rain, or leaving off cloaths, or by what other means it may come to paſs, diſpoſes very many to diſtempers of the *Thorax*. Wherefore in our Idiom the cauſe being put for the effect, a Cough is called *Catching of cold*.

Partly from the Lungs.
From the breaſt ill formed.
From the hereditary diſpoſition.
From foregoing diſtempers of the breaſt.

Theſe are the chief cauſes and occaſions which occur from the blood any ways depraved, and therefore depoſiting a peccant matter into the Lungs. There follow other cauſes in regard of the Lung it ſelf, *viz.* thoſe which diſpoſe this Bowel more readily to a Cough or a Phthiſis, of which there are three ſorts. 1. An ill frame of the Breaſt. 2. And innate weakneſs of the Lungs, or hereditary diſpoſition to a Conſumption. 3. Preceding diſeaſes of the *Thorax*, as a Wound, a Blow, a Pleuriſie Peripneumony, Empyema, ſpitting of Blood, the ſmall Pox and Mealles, *&c.* 4. The incongruity of

From incongruity of the air.

of air, which is inſpired (as deſerving a place among the procatarctic cauſes.) By reaſon of any one of theſe cauſes, and ſometimes of many together, the matter provoking a Cough, proving often after Conſumptive, doth eaſily aſſault the Lungs, and enters them, and frequently imprints a deadly hurt. On each of theſe we ſhall inſiſt a little.

The reaſon of the former expoſed.

Firſt therefore as to the frame of the Breaſt the caſe ſtands thus; *viz.* that the Lungs being ſtill whole and ſound, and free from any Phthiſical impreſſion, may be kept for a long time in their office, it will behove that they ſtill be exerciſed with a motion that is vigorous, and with ſtretched out ſails as it were to diſcharge the ſtrong interchanges of the Syſtole and Diaſtole; to that end, that the air being plentifully ſuckt in, may be admitted to their inmoſt appartments, and from thence immediately be caſt back for the moſt part together with all the effluvia and ſooty vapors at every change of breath. Wherefore ſince the action of the Lungs doth depend much on the frame of the *Thorax*, as being the moving Engine, it muſt needs be, that by reaſon of its ill faſhioning, the function of breathing becomes defective in many things. There are two ſpecial kinds of a Breaſt ill framed, (*viz.* crookedneſs, and ſhoulders like wings) for which reaſon many are found prone to a Phthiſis: the reaſon of which is, that in any ſuch figure of the breaſt, being either depreſſed or made long, the Lungs do neither injoy a ſpace ſo free and ample, nor can the moving Muſcles be ſo ſtrongly contracted as in a ſquare breaſt.

What an hereditary diſpoſition is.

2. The innate debility or hereditary diſpoſition of the Lungs to a Conſumption is ſo frequent and vulgarly known, that when any is found inclining to a Conſumption, he is preſently queſtioned, whether his parents were not obnoxious to this Diſtemper? Very many of theſe being endued with a narrow breaſt and a neck ſomewhat long, and of a conſtitution very tender, contract a Cough from the leaſt occaſion; neither can they endure a cold or moiſt air. To ſome of theſe a Manſion in a City is very prejudicial, where the air is breathed in thick and ſmoaky; on the contrary, to others prone unto the ſame diſpoſition it is very friendly (the reaſon whereof we ſhall diligently inquire hereafter.) To all of them a North-wind is for the moſt part an enemy, conſidering that it uſually irritates a Cough, alſo Spitting of blood, a Pleuriſie, or Peripneumony, *viz.* The Pneumonic or the Thoracical Veſſels being thereby ſtufft, and in the mean time the blood being rendred more turgid and ſharp, by reaſon of tranſpiration hindred, and effluvia's reſtrained within the maſs thereof.

In what it conſiſts.

For an Hereditary diſpoſition to a Phthiſis doth chiefly conſiſt in theſe two things, *viz.* 1. In regard the Patients being endued with a more ſharp and elaſtick blood, do require a more plentiful tranſpiration; which perhaps if it be leſs granted, the matter that was wont to evaporate redounds upon the infirm Lungs. 2. If the Pneumonic Veſſels be too looſe and tender, they do not duly contain the Serum and other recrements of blood within the diſſolved maſs thereof, but they ſometimes ſuffer both them and a certain portion of the blood it ſelf to break out into the Tracheal paſſages: whoſe moving Fibres, when they are infirm, do not preſently turn forth what is poured out into the cavities; but they ſuffer it to abide and putrifie in the ſame place, and at length to degenerate into black filthy gore corruptive both of the Lungs and blood.

What the conſumptive diſeaſes of the breaſt are.

3. A Phthiſis is ſometimes the product or conſequent of ſome other previous diſtempers of the Breaſt. Thoſe conſumptive paſſions chiefly are Empyema's, Pleuriſies, a Peripneumony and Impoſtume of the Lungs; and ſometimes the ſmall Pox, Meaſles: alſo irregular Feavers ill or ſlightly judged, do cauſe the ſame effect. The chief of theſe diſtempers, or at leaſt thoſe which are proper to the *Thorax*, together with the rendring the reaſon of the cauſes, and how they diſpoſe to a Conſumption, ſhall be declared hereafter, with the reaſons and manner of procedure; in the mean time we are to take notice, that this kind of fault is common to them all, that is to ſay, they diſſolve the unity and weaken the tone of the Lungs, and pervert the temperature of the blood; whence whatſoever incongruous or diſtempered thing is poured out upon them from its depraved maſs, they do eaſily admit thereof, and difficultly or not at all drive it back.

The influence of the air for exciting a Conſumption.

4. The procatarctic cauſes of a Phthiſis being now explained, *viz.* thoſe which conſiſt as well from the blood as the Lungs, there is another common to them both, which may be juſtly added, and (although altogether extrinſic) hath great affinity with them both, *viz.* the condition or temper of the air breathed in. For ſuch is the influence hereof to ſome Conſumptive Perſons, that the cauſe of the diſeaſe is ſometimes wholly aſcribed to the incongruity of the air wherein they dwell, and for a cure the alteration of air or ſoil is preferred to all other remedies whatſoever. Hence many of our Country troubled with a Cough, or being in a Conſumption, flock to the Southern parts of *France*; and others in the mean time who cannot go beyond Sea; or will not, preſently haſten to remove out of the City-ſmoke into the Country as to a moſt undoubted refuge

fuge: wherefore all our Villages near *London*, which injoy a clear and open air, are eſteemed as ſo many Spittles for Conſumptive Perſons. Notwithſtanding all do not alike receive help from ſuch a change of places; for many either paſſing to *France* or to Country Villages, do in thoſe places rather find their graves than Health. And therefore *London* is not preſently to be forſaken by all phthiſical Perſons: for I have known many obnoxious to a Cough or Conſumption to have enjoyed their health much better in this ſmoaky air than in the Country. So that for Cure of the ſame Diſeaſe, while ſome avoid this City as Hell, others flye to it as to an *Aſylum*.

The groſſer and City-air to ſome Conſumptive perſons healthful, to others hurtful.

The reaſons of theſe things do clearly appear out of the Doctrine of Breathing before handled; for we do demonſtrate the blood paſſing through the Lungs, both as to its kindling or vitality, and as to its motion doth chiefly depend on nitrous air ſuckt in; whence it is a conſequence, that the tenor of this ought to be ſo proportioned to the temperament of that, that the blood being moderately kindled within the *Præcordia*, may burn out clearly and vigorouſly, as well without ſmoak and footineſs as without too intenſe a flame, and that it may paſs the Pneumonick Veſſels freely, and without any hindrance of leaving off recrements. Wherefore a moiſt, fenny, and cloſe air, as it is healthful to none, ſo to them that Cough it is eſpecially hurtful; on the contrary, a ſerene and mild air, moderately injoying the Sun and wind, as it is healthful to all perſons, ſo it is friendly to all Conſumptive Perſons. As to other conditions of the air, ſome eſcape a Cough, or looſe it living in mountainous places expoſed to the Sun, where the impendent Atmoſphere being free from all thick, ſmoaky, and feculent vapours whatſoever, abounds with nitrious particles: for thoſe whoſe thick and feculent blood abounds with an impure Sulphur, to kindle this duly and to waſte the dreggineſs, there is need of a very thin and nitrous air. If the Lungs be not too tender, but firm and ſtrong, they endure the more fierce aſſaults of its Particles; on the other ſide, they who have a thin and ſubtile blood, eaſily diſſolvable and endued with a more pure but very little Sulphur, and having tender and ſoft Lungs, very ſenſible, and of a fine texture; theſe perſons being impatient of a nitrous and ſharper air, are moſt at eaſe and beſt in a thick and more ſulphureous one. Wherefore it conduces to theſe perſons, that they breath the groſs and more fat air of a ſmoaky City; which to an impoveriſhed and more thin blood, doth afford Sulphur (which fails ſometimes) and alſo Nitre, and doth ſomething thicken and fix its ſubtile conſiſtence; moreover it dulls the ſubſtance or texture of a Lung too much ſenſible and more thin, and is a defence againſt the invaſions of a more ſharp and improportionate Air. It is manifeſt by frequent experience, that a thicker Air, provided it be ſulphuerous, proves very benign to ſome Phthiſical perſons (that I do not ſay to all.) It is a common obſervation, that a Conſumption ſeldom infeſts thoſe Regions either in *England* or *Holland*, where fires are nouriſhed by turff, and do breath a very ſulphureous odour, yea rather thoſe places are chiefly wholeſom and frequently ſanative to Perſons obnoxious to a Phthiſis or labouring under it. To which we may add, that a ſuffumigation of Sulphur and Arſenic (which is filled with much Sulphur) is reputed for the curing of almoſt incurable Ulcers of the Lungs, although the laſt, yet the moſt efficacious remedy. Moreover add to this, that pectoral Medicines prepared of Sulphur are far to be preferred to any other; ſo that Sulphur is juſtly reported by Chymiſts to be the Balſam of the Lungs. By what order, and by what means theſe Medicines do work, and ſo notably help in Diſeaſes of the *Thorax*, we ſhall hereafter make diligent ſearch into: in the mean time that Sulphureous Air is found helpful to ſeveral Phthiſical Perſons, the reaſon conſiſts in theſe two things; *viz.* in the firſt place, as we now intimated, from ſuch an Air ſuckt in there is help brought to the jejune and depauperated blood and to the tender Lungs. Secondly, that the ſulphureous Particles being ſuckt in with the nitrous, do provide againſt, or take away the acidities of any of the humors (by which their flowings and extravaſations into the Lungs do chiefly ariſe.) And for this reaſon it is that ſulphureous Medicines, being alſo taken inwardly, do confer ſo excellent a help to them that cough or are phthiſical: and therefore Sulphur, as I now hinted, hath the report of being the Balſam of the Lungs. For as Balſamic things applied to an Ulcer or Wound extinguiſh the acidity of the Ichor there ſweating out and corrupting and paining the little Fibres, ſoon eaſe the pain, and afterwards heal the wound; ſo alſo the ſulphureous Particles, paſſed into the Lungs either with the air or with the blood, in as much as they provide againſt or aboliſh the acidities of all humors, *i. e.* the blood, the Serum, the Lympha, the nervous or nutritive Juice, they conduce to the prevention or cure of a Conſumption. We ſhall in what follows more at large declare the cauſe, when ſulphureous Medicines ſhall be particularly treated of.

The reaſon whereof is inquired.

A ſulphureous air healthful to ſome Conſumptives.

Sulphureous Medicines chiefly agreeing.

The reaſon thereof diſcourſed.

The conjunct and procatarctic cauſes of a Phthiſis being thus handled, it will not be neceſſary to diſcourſe much touching the evident cauſes. For in what manner a cloſing

of the Pores by cold, a ſurfeit or tipling, and other errours of ſeveral ſorts, in the ſix non-naturals, diſpoſe to thoſe diſtempers, and ſometimes preſently do bring them, is ſo clear, that it needs no explaining. Neither is there any reaſon we ſhould be long delayed about the Semiotical part of this Diſeaſe; nevertheleſs it is fit we obſerve the divers ſtates or diſtinctive ſigns which certainly belong unto it. 1. When it is meerly a Cough. 2. When it begins to degenerate into a Phthiſis. 3. When it is a perfect and almoſt deſperate Phthiſis. From which things duly deſigned, the Prognoſtic of the above-mentioned affections will be very apparent.

The three times or diſtinct ſtates of a Cough.

when new, there is no ſuſpicion of a Conſumption.

1. And in the firſt place what belongs to a new Cough, and as yet alone, this taking its riſe from any cauſe whatſoever in bodies prediſpoſed to a Phthiſis, will ſcarce ever be free from the ſuſpicion of danger; but in a ſtrong man, and one who hath often before endured a Cough Scot-free, it will not be immediately to be feared: for when being ſtirred up from a more forcible evident cauſe, without Feaver or indiſpoſition of the whole body, it ſhall not be very troubleſom, then it meerly paſſes for a cold being taken, and is altogether neglected, or in a ſhort time is wont to be finiſhed without many or very conſiderable Remedies. Moreover if a ſmall Feaver with thirſt and want of appetite accompany this, there is hope that the blood being reſtored to its due temperament, the Cough then will ceaſe of its own accord: but if it be protracted longer, and not eaſily yield to vulgar Remedies, and produces much ſpitting, and that diſcoloured, it muſt not be any longer neglected, but be provided againſt by a method of healing, and by fit remedies and an exact courſe of diet. For then it may well be ſuſpected, that the Lungs being prejudiced in their ſtructure, do not circulate the blood entirely, but let fall the Serum and Lympha, and frequently the nutritive Juice; and moreover thoſe humors ſo laid aſide do putrifie; and from thence the blood is defiled, which by a reciprocal hurt prejudices again the Lungs.

When it begins to induce a Conſumption.

2. But if to a Cough growing daily worſe and worſe with plentiful and thick ſpittle, a languiſhing, and pining of the whole body, loſs of appetite, difficult breathing, thirſt, and fervent heat of the blood be added, there is great cauſe of ſuſpicion that it is come at leaſt to the firſt limits of a Phthiſis (if not further.) Wherefore it will behove us to uſe all means, whereby the Lungs may be freed from the great quantity of matter heaped up together, and be defended from its continual aſſault or invaſion; and alſo that the maſs of blood being cleanſed from all dregs, and reſtored to its due temperament whereby it may rightly contain its ſeroſities and other humors within it ſelf, or transfer them to ſome other place than the Lungs.

When it becomes a confirmed Conſumption.

3 But if, beyond the ſtate of this diſtemper now deſcribed, plenty of ſpittle, and that diſcoloured, ſhall be daily increaſed, and all other things growing worſe and worſe, a dejection of the whole ſtrength, and a Hectic Feaver with a continual thirſt, night Sweats, an Hippocratical face, an utter decay of the fleſh almoſt to the drineſs of a Skeleton, happen upon all theſe, then for the moſt part no place is left for Medicine, but only a dreadful prognoſtic; at leaſt all hope of Cure being waved, we muſt inſiſt upon Anodynes, whereby an eaſie death may be procured.

The curing method, and firſt againſt a beginning Cough.

What therefore belongs to the Cure of a Cough in general, according to the three above-mentioned ſtates of this Diſeaſe, a threefold method of healing ought to be appointed, *viz.* that bounds as it were being ſet, we may more diſtinctly preſcribe what is to be done for the cure of a Cough, whilſt being on this ſide of the limits a Phthiſis, it paſſes only for a cold catched. 2. What manner of healing to a beginning Phthiſis. 3. What to a Phthiſis conſummated, or deſperate.

1. Although againſt a new Cough for the moſt part there are uſed only Remedies Emphirical, and ſcarce any of the common People but are furniſhed with many and divers of this ſort, which every where without the advice of a Phyſician very many confidently take, and without method, and give them to others: yet men of a delicate conſtitution, or inclining to a Conſumption Hereditarily, or ſometimes formerly in hazard from a Cough, ought immediately to provide againſt the firſt aſſaults thereof, and readily betake themſelves to the Precepts of Phyſick; according to which, that the method of healing may be duly inſtituted, the curatory indications ſhall be chiefly theſe three *viz.* 1. to appeaſe or take off the diſorder of the blood, from whence the fluxes of the Serum do proceed. 2. To derive the excrements of the blood and all *exuviæ*, apt to ſeparate from it, from the Lungs to the Pores of the skin, or to the urinary paſſages, and into the other Emunctories. 3. To ſtrengthen the Lungs themſelves againſt the reception of the Serum and other humors, and alſo to defend them againſt the invaſion of outward cold, whereby they are wont to receive further hurt. Upon each of theſe we ſhall treat a little more plainly.

Three indications.

The firſt reſpects the effervescence of the blood.

1. The firſt indication reſpects as well the boiling up of the blood, wherein by rea-

ſon

ſon of the effluvia's reſtrained, it grows too fervently hot, and boils in the veſſels; as its diſſolution, whereby being ſolved in its conſiſtence, it lets go too much Serum and other humors from its embraces. For the taking away of both, a thin diet muſt be appointed, and, the injury from outward cold carefully declined, a little more ſweating ought to be procured, or at leaſt the accuſtomed reſtored. To this end let the Patient put on thick garments, and let him keep his Bed or Chamber, at leaſt let him hardly go out of this houſe, evening and morning let a ſmall breathing Sweat be provoked by Poſſet-drink boiled with Roſemary or Sage. If notwithſtanding all this the Cough increaſes, Phlebotomy, if the ſtrength and conſtitution will bear it, is often uſed with ſucceſs: after which Hypnoticks for the moſt part help, in as much as they retard the motion of the heart, and conſequently the too precipitate courſe of blood: moreover they cauſe it to circulate in the Pneumonic Veſſels gently and mildly without any great throwing out its ſeroſities, and to ſend away what is ſuperfluous either by Sweat or Urine. To this purpoſe pectoral Decoctions are alſo too be adminiſtred, in as much as they deſtroy the acidity of humors, and hinder the diſſolution of the blood, and its melting into ſeroſities. By the like reaſon and manner, Medicines prepared of Sulphur do ſo ſignally help againſt a Cough.

The ſecond reſpects the derivation of the Serum and other excrements from the Lungs.

The ſecond indication, *viz.* that the Serum and other recrements of the blood, derived from the Lungs, may be evacuated by other ways, is performed by Diaphoretics, Diuretics, and mild Purgers; which ought to be mixed with other Remedies, or now and then uſed alone. Wherefore after Phlebotomy we uſe to preſcribe a gentle Purge, and ſometimes to repeat it. Among the Ingredients of the Pectoral Decoction let the Root of Chervile, Butchers-broom, Elicampane, and other things that provoke Sweat and Urine be put. Hog-lice, volatile Salt of Amber, and other fixed Salts and Powders of Shells made into Pills with Turpentine are often given with ſucceſs.

The third intends the ſuppreſſing the Catarrh and ſtrengthning the Lungs.

The third indication, that the Lungs and their paſſages might be defended againſt the flowing of humors, the encountring of cold, and the ſuppreſſion of the Catarrh, as they commonly call it, is performed by Linctus's, Lohochs, and other private Remedies, and chiefly reſpects two things; *viz.* that the mouths of the Veſſels and Glandules opening into the *Trachea* be ſhut with moderate Aſtringents, leſt they ſhould too much caſt out the ſeroſities into it: and ſecondly, that the ſides of the Tracheal paſſages may be made ſmooth and glib, that neither from the pouring out of the ſharp Serum, nor invaſion of any outward cold they may be offended, and continually provoked into a troubleſome Cough; and moreover when thoſe paſſages are made ſlippery enough, the ſpittle ſometimes obſtinately cleaving to their ſides, might be the more eaſily coughed out. For the firſt intention it is, that Conſerve of red Roſes, Olibanum, Maſtich, Lohoch of Pine-tree, Syrup of Jujubes, of dried Roſes, of Cup-moſs, and other Aſtringents are often put into the forms of Pectoral Preſcriptions. For the ſecond intention Liquoriſh, with the divers preparations thereof, is reputed a famous Remedy againſt any Cough: for this purpoſe Syrups and Lohochs, and all other ſweet Pectorals ſeem to be ordained. To which is added Oyl of ſweet Almonds, either adminiſtred by it ſelf, or brought with Pectoral Syrups after a long ſtirring of them together into a milk-form liquor.

Forms of Medicines which are moſt in uſe.

Theſe are the chief Therapeutic indications, together with the apt intentions of healing, which ſeem chiefly to be of uſe for a new Cough, while as yet we have no ſuſpicion of a Phthiſis, or at leaſt that it ſubſiſts without the manifeſt limits thereof; it now remains, after this general method briefly ſhadowed out, that we ſubjoin certain choice forms of Medicines appropriated to every intention. Theſe though they are manifold and of divers preparations, yet thoſe which are of chiefeſt note and moſt in uſe, are Mixtures, Linctus's, Lohochs, Tinctures, Balſams, Troches, Lozenges, Powders, Pills, Decoctions, and diſtilled Waters. Of each of theſe we ſhall ſet down ſome choice Receipts.

1. Mixtures.

Take of Syrup de Meconio, of Jujubes, of each an ounce and half; of powder of Olibanum a dram, the water of Earth-worms, or of aq. Hyſterica, or Peony compound a dram, mingle them. The doſe is one ſpoonful at bed-time and after midnight.

Take of the water of Snails, of Earth-worms, of each an ounce and half; of the liquid Laudanum Tartarizated two drams, Syrup of Violets an ounce. The doſe is one ſpoonful at bed-time.

Take of Snail-water ℥vj, *Syrup of the juice of ground-Ivy,* ℥iij. *Flower of Brimſtone* ʒß. *mix them. The doſe is one ſpoonful at bed-time, and ſoon in the morning.*

Take of our Syrup of Sulphur 4 ounces, Water of Earth-worms 1 ounce. Doſe 1 ſpoonful after the ſame manner.

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2. Linctus's.

Take of Syrup of Jujubes, Maiden-hair of each one ℥ and half, Syrup of red Poppys 1 *ounce, mix them, to be lick'd with a Liquoriſh Stick.*

Take Oyl of Sweet-Almonds freſh drawn, Syrup of Maidenhair, of each 1 *ounce and half, white Sugar-candy* 2 *drachms, mix them by beating in a Glaſs-morter, or ſhaking them in a Glaſs Vial till it wax white.*

3. Lohochs.

Take Conſerve of Red Roſes 2 *ounces and half, Lohoch Sanum* 1 *ounce and half, Speci. Diatragacanth. frig.* 1 *dram and half, flowers of Brimſtone half a dram, Syrup of Violets or red Poppyes as much as ſufficeth, let it be made a ſoft Lohoch. Doſe* 1 *dram and half at night and early in the morning; at other times to be licked with a Liquoriſh ſtick.*

Take of the powder of the leaves of Hedg-muſtard, or Rockets, 1 *ounce and half, clarified Honey* 4 *ounces, mix them for a Lohoch, let it be adminiſtred after the ſame manner. It agrees with cold Conſtitutions.*

4. Tinctures.

Take of Tincture of Sulphur, without empyreuma 3 *drams, Doſe from* 6 *drops to ten in the evening, and early in the morning in* 1 *ſpoonful of Syrup of Violets, or of the juice of ground-Ivy; I ſcarce know a more excellent remedy for any Cough, provided there be no feaver.*

Take of Tincture of the Sulphur of Antimony 2 *drams, Doſe* 20 *drops evening and morning in one ſpoonful of the pectoral Syrup.*

Take the Tincture of Gum Ammoniack (prepar'd with the Tincture of Salt of Tartar) 1 *ounce, Doſe from* 15 *drops to* 20. *After the ſame manner the Tinctures of Galbanum, Aſſa fœtida, Gum of Ivie (prepar'd after the ſame manner) are proper for a Cough in any cold Conſtitution.*

5. Balſams

Take of Opobalſamum 2 *drams, Doſe from* 6 *drops to ten in a ſpoonful or two of Hyſſop, or Penny-royal, or any other Pectoral water.*

Take of the Balſam artificially diſtill'd, commonly call'd the Mater Balſami, *two drams, Doſe from* 6 *drops to ten in one ſpoonful of Syrup of Violets or Canary Wine evening and morning.*

Take Balſam of Sulphur two drams, the doſe from five drops to ten after the ſame manner.

Take of Balſam of Peru *one dram, Doſe from two drops to* 4 *or* 6 *in Conſerve of Violets.*

6. Troches.

Take of the Species of Diatragacanth. frigid. ℥ß. Liquoriſh ʒ j. flower of Sulphur ℈ij. flower of Benzoin ℈j. Sugar Penids ℥iij. make a Paſte with the diſſolution of Gum Tragacanth in Hyſſop-water, form it into troches of the weight of ʒß. Take one often in the day or in the night.

Take of the ſeeds of white Poppies ʒ vj. of the powder of the flowers of red Poppies ʒ j. extract of Liquoriſh ʒ ij. milk of Sulphur ʒß. Sugar Penids ʒ ij. with mucilage of Quince-ſeeds make a Paſte, and form it into troches.

Take of the Species Diaireos, *of the lungs of a Fox, of each ʒß. Sugar Penids ʒij. with the diſſolution of Gum Tragacanth, make them into Troches.*

Take of powder of Elicampane, Anniſeeds, Liquoriſh, of each ʒij. flower of Brimſtone ʒj. of Tablet Sugar ʒiß. juice of Liquoriſh diſſolv'd, as much as will ſuffice, make Troches.

7. Lozenges.

Take of the Species Diatragacanth. frigid. ʒiij. powder of the flowers of red Poppies, milk of Sulphur, of each ʒß. of Sugar diſſolv'd in Poppy-water, and boyl'd to make Tablets, ℥iiij. form lozenges of ʒß. weight.

Take of Species Diaireos, *of the Lung of a Fox, of each ʒiij. flower of Brimſtone, powder of Elicampane of each ʒß. of the whiteſt Benzoin ʒj. make them in a fine powder,*

der, adding of Oyl of Anniſeeds ℈j. *Sugar'd diſſolved, and boyled to a height to make lozenges* ℥viij. *for lozenges of* ʒß. *weight.* PHAR. Part. II.

8. Powders.

Theſe though more ſeldom, yet are ſometimes given with ſucceſs in a Cough, and Pneumonic diſtempers.

Take of the tops of Ground-Ivy ſomewhat reddiſh, a ſufficient quantity, bruiſed let them be form'd into a Cake, which dryed preſently in the hot Sun, reduce into fine powder, and keep it in a glaſs. This plant keeps its virtue with ſmell and taſte longer than any either Conſerves or Syrups, and greatly profits in a grievous and pertinacious cough. Take from ʒß. *to a dram, in diſtill'd water, or pectoral decoction twice in a day.*

After the ſame manner Powders of other pectoral Plants are prepared, and taken with benefit.

Take of Cup-moſs or chin-cups ʒiij. *milk of Sulphur* ʒj. *Sugar-candy* ʒß. *make a powder; the doſe from* ℈j. *to* ʒß. *twice in a day. This powder is given with great benefit to thoſe labouring with a chin-cough.*

Take of the flour of Brimſtone, Olibanum, *Ceruſe of antimony, of each* ʒij. *divide it into* xii. *parts, take one part in the morning, and another in the evening in a ſpoonful of a convenient vehicle.*

9. Pills.

Take of Aloes roſata, *or rather of* Ruffus's *his Pill, flower of Brimſtone of each one dram and half, flowers of Benzoin* ℈j. *Juice of Liquoriſh diſſolv'd in as much Snail-water as will ſuffice to make a maſs, form it into ſmall Pills to be taken 4 at night to be repeated every or every other night.*

Take of powder of Elecampane, Liquoriſh, flower of Brimſtone, of each one dram, flowers of Benzoin half a dram, Tarr as much as is ſufficient, form it into ſmall pills, the doſe 3 or 4, evening or ſoon in the morning.

Take of Millepedes or Hogs-lice prepared ʒij. *The powder of the ſeeds of Nettles, Burdock of each half a dram, Oyl of Nutmegs diſtilled* ℈j. *Salt of Amber half a dram, Juice of Liquoriſh what will ſuffice, form it into ſmall Pills, take three in the morning and in the evening.*

10. *Decoctions.*

Theſe are taken either by themſelves, or with the addition of Milk. Among thoſe which are of the firſt kind, 1. The Pectoral Decoction according to the *London Diſpenſatory*, offers it ſelf. Which is taken twice a day from ℥iiij. to vj. or ℥viij.

Take of the leaves of Ground-Ivy, white Maiden-hair, Harts-tongue, Coltsfoot, Agrimony, of each one handful, Roots of Chervil, Knee-holm, of each one ounce, Carthamus and ſweet Fennel ſeeds, of each half an ounce, boyl them in 6 pints of Spring-water to the conſumption of half, adding towards the end Liquoriſh three drams, Raiſins ſtoned two ounces, Jujubes, n° vi. or clarified Honey three ounces, make an Apozeme, clarifying it with the white of an Egge; Doſe 6 ounces warm, 2 or 3 times in a day.

Decoctions taken with Milk, are uſed morning and evening inſtead of Breakfaſt and Supper, according to the manner following.

Take the flowers of greater Daiſies one handful, three cleanſed Snails, half an ounce of candied Eringo roots, Barly 3 drams, boyl them in a pint and half of water to a pint. Take 6 or 8 ounces warm, adding a little milk; and afterwards the quantity encreaſed by little and little.

After the ſame manner, Cup-moſs, Ground-Ivy, St. *John*'s-wort, and other pectoral herbs are boyl'd and taken with Milk.

The Decoction of Woods often does conduce much to the cure of a ſtubborn Cough, eſpecially if appointed in the place of Beer, for ordinary drink, and taken for ſome time.

Take

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Take of the roots of Sarſaparilla 4 *ounces, China two ounces, white and red Sanders of each half an ounce, ſhavings of Ivory and Harts-horn of each* 3 *drams, let them be infuſed, and boyled from* 8 *pints of Conduit-water to* 4, *adding Liquoriſh* 6 *drams, Raiſins ſtoned an ounce and half; in a phlegmatick or colder conſtitution, add of ſhavings of* Lignum vitæ.

II. *Diſtilled Waters.*

Every one may compound manifold and divers forms of theſe as occaſion requires, and appoint according to the conſtitution of the Patient, ſometimes ſimple Milk, ſometimes Milk with ſome part of Wine, ſometimes Ale, or *Brunſwick* Mum. For a Sample we will preſcribe the form of theſe.

Take of the leaves of ground-Ivy, Hyſſop, Penny-royal, of each four handfuls, of Snails half-boyl'd in their ſhells two pounds, Nutmegs ſliced nº. vj. *Upon all being cut ſmall pour eight pints of freſh milk, let it be diſtilled in the common Organs,* i. e. *a Pewter-Still.*

The doſe 3 *ounces twice or thrice in a day by it ſelf or with ſome other Medicine.*

Every doſe let it be ſweetned when it is taken with Sugar-candy, or with the ſyrup of the juice of Ground-Ivy.

In a conſtitution leſs hot, eſpecially if there be no fervent heat of the blood or *Præcordium*, to ſix or ſeven pints of Milk, add one pint or two of Canary wine; and in a phlegmatic or old body, inſtead of Milk let the *Menſtruum* be Ale or *Brunſwick* Beer, *i. e.* Mum.

Moreover, in Winter-ſeaſon when Snails cannot eaſily or ſcarcely be procured at all, there may be ſubſtituted in their ſtead Lambs or Sheeps Lungs, alſo ſometimes Calves, being half-boyl'd and cut ſmall, with the forementioned ingredients, and a fit *Menſtruum* being added, let them be diſtilled in common Organs, or Roſe-ſtills.

The convulſive Cough of Children call'd the Chin-cough.

To this form, treating of a Cough not yet arrived to a Phthiſis, ought to be referred the convulſive or ſuffocation Cough of children, and in our Idiome called the *Chin-Cough*. This aſſaults chiefly Children and Infants; and at certain ſeaſons, *viz.* Spring and Autumn eſpecially, is wont to be epidemical. The diſeaſed are taken with frequent and very fierce fits of Coughing, wherein namely the Organs of breathing do not only labour in pain, but alſo being affected convulſively, they do variouſly ſuſpend or interrupt their actions; but for the moſt part the Diaphragma convulſed by it ſelf, or by the impulſe of other parts, doth ſo very long obſtinately continue the Syſtole, or Diaſtole, that Inſpiration, or Expiration being ſuppreſs'd for a ſpace the vital breath can ſcarcely be drawn; inſomuch that coughing as being almoſt ſtrangled they hoop, and by reaſon of the blood ſtagnating, they contract a blackneſs in their countenance; if perhaps, thoſe organs not in ſuch a meaſure convulſed, they are able to breathe any thing freer; notwithſtanding they are forced always to cough more vehemently and longer, until they wax faint.

The Reaſon theneof.

The formal reaſon or conjunct cauſe of this diſeaſe, conſiſts in theſe two things, *viz.* that there is preſent a quick and vehement irritation of the Lungs, whereby they are almoſt continually incited to throw off ſomething troubleſome by Cough; and alſo that the motive parts of the *Thorax*, *viz.* the Nerves and nervous fibres being prediſpoſed to convulſions, as often as they are irritated, do excite a Cough not regular but convulſive, and ſuch as is oppoſite or injurious to the uſual function of breathing.

The cauſe partly n Catarrh.

The matter provoking the Lungs ſo frequently into a Cough ſeems to be the *Serum*, unceſſantly ſoaking out of the maſs of blood, by reaſon of its frame being too much looſened, and troubling the parts belonging to the breaſt, inaſmuch as it diſtills as well through the tracheal arteries into the hollowneſs of *aſpera arteria*, as that it is poured in plentifully through the Pneumonic arteries into all the open paſſages.

A convulſive diſpoſition of the parts of the breaſt.

The convulſive diſpoſition of the moving parts, as in other convulſive diſtempers, ſeems to proceed from a heterogene and elaſtic matter falling from the brain through the nervous paſſages, together with the nervous liquor, into the ſmall moving fibres of the breaſt; wherefore, when the ſpirits that are contained in thoſe little fibres, are ſtirr'd to perform violent motions of breathing out, they paſs into convulſive motions.

The prognoſtick of this diſeaſe.

What relates to the Prognoſtick of this diſtemper, this Cough although it be ſeldom very dangerous or mortal, yet it remains very difficult of cure; and frequently it rather ceaſes by change of the ſeaſon than is extinguiſhed by remedies. The cauſe whereof is, that here not, as in an uſual Cough, the blood onely ought to be altered, and its recrements to be derived out of the Lungs, to be conveyed to the habit of the body by ſweating, but Moreover an amendment of the nervous juice ought to be procured.

About

About the curing of this diſeaſe, the way of healing uſed in other kinds of Coughs doth rarely profit here; wherefore old women and Empiricks are oftener conſaulted than Phyſitians, and the rational curatory method being poſtponed and neglected, remedies for the moſt part onely Empirical are brought into uſe.

Cures firſt Empirical.

Among the many remedies of this kind, theſe two following are preferr'd to all others, and chiefly wont to be uſed; *viz.* Cup-moſs or Chin-moſs or Chin-cups, and the various preparations thereof and compoſitions are taken inwardly, and if there ſhall be need of any further medicine, that ſome Bugbear being preſented, the Child labouring with it may be caſt into a ſudden fright. But if the wiſhed ſucceſs wanting to adminiſtrations of this ſort, Ptiſans, Syrups, Julips, or Decoctions, and other pectoral helps are rejected, and frequently they deſiſt from all other Medicines, expecting until the diſeaſe either at length of its own accord determine, or be cured by reaſon of the ſucceeding change of the year.

Chin-cups a great remedy.

1. Chin-cups or Moſs is in moſt common uſe in our Countrey againſt the Coughs of Children, and is vulgarly enough known as to its form and manner of growing. It is of an aſtringent nature (as far as we gather by its taſte) and contains in it ſelf particles ſomewhat ſharp and biting, and ſmelling of plenty of volatile Salt: from whence we may ſafely conjecture that its uſe is to fix the blood, and to appeaſe the fluxes of *Serum*, and moreover by volatiliſing the nervous juice, to take away the convulſive diſpoſition. It is uſually adminiſtred in form of Powder, Decoction, and Syrup, according to the following Receipts.

The reaſon whereof is inquired.

Take of Chin-cups in powder one dram, Sugar-Candy one Scruple, mix them, divide it into three or four parts, take a doſe morning and evening with a fit vehicle.

Take of the ſame Cup-moſs two drams, milk of Brimſtone two ſcruples, powder of Anniſeeds one ſcruple, divide it into ſix parts to be taken as the former.

Take of the ſame Chin-moſs or cup-moſs one dram boyled in milk for one doſe; take it morning and evening. To thoſe with whom milk doth not agree, or to whom it little profits, let it be boyled in Spring-water or Hyſſop-water, or in any other pectoral water, and let it be given from two ounces to four, twice in a day, ſweetning it with Sugar or ſome fit Syrup.

Take of this Muſcus Pyxidatus or chin-moſs one ounce, boyl it in two pints of ſome pectoral water to the conſumption of half: to it ſtrained add of Sugar-Candy one pound, and evaporate it in a gentle bath, to the conſiſtence of a ſyrup.

Frights profit in this Cough.

2. The other remedy for the convulſie Cough is wont to be, that they be caſt into ſome ſudden fright; from hence, when as medicines effect leſs, with the vulgar it is a familiar practice, that, to fright them, while a great Mill is driven about with a ſcreeking noiſe, and a dreadful aſpect in the wheels, the diſtempered be put into the Trough or Receiver of the Grain or Corn, and from thence the ſudden cure of this diſeaſe ſometimes happens. The reaſon whereof without doubt conſiſts in this, that the Animal ſpirits being put to flight and forced into freſh diſtractions, they relinquiſh their former diſorders; moreover, the convulſive matter is either diſſipated by that diſturbance, or is forced into other nerves where it is leſs troubleſome.

The rational cure.

The Empirical cure of this diſeaſe being deſcribed after this manner, together with the remedies vulgarly uſed, and the rendring a reaſon of the cauſe at leaſt probably unfolded, from hence it will be lawful to deſign rational method of curing, and perhaps more efficacious againſt childrens Coughs of this kind. Wherefore, in ſuch a caſe ſometimes ſucceſſefully enough I have preſcribed according to the following forms. And ſeeing we ought to begin with purging,

Purging.

Take of the ſyrup of Peach flowers one ſpoonful, of Aqua Hyſterica one ſcruple, mix it, and let it be taken with government.

Or, take of Mercurius dulcis 6 *grains, Scammony prepared with Sulphur, Reſine of Jalap, of each three grains; make a powder, give it in a little Pulp of a preſerv'd Cherry to a lad ſix years old, and let the doſe be encreaſed or leſſened according to the age, let the Purge be repeated in 6 or 7 days.*

If the Patient (as it often happens) be prone to vomit, Take of Oxymel of Squils 6 drams, Salt of Vitriol 4 grains, mix it for a child of ſix years old, and according to this proportion let the doſe be accommodated to others. I have known a Vomit of this kind taken every morning for four or five dayes together with good ſucceſs.

Veſicatories.

Veſicatories or Medicines drawing bliſters are in daily uſe, and are applyed ſometimes to the *Nucha* or nape of the Neck, another while behind the Ears, then to the inſide

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inſide of the arms near the arm-pits, and as ſoon as theſe ſores begin to heal in theſe places, let others be raiſed in other places.

Inſtead of Beer let the following Decoction be uſed for ordinary drink.

Take China-roots an ounce and half, of all the Sanders of each half an ounce, the ſhavings of Ivory, and Harts-horn of each three drams, let them be infuſed and boiled in ſix pints of ſpring-water to the conſumption of half, adding Raiſins ſtoned an ounce and half, Liquoriſh three drams.

Mixtures. *Take of Spirit of Gum Ammoniac with Salt Armoniac a dram, Syrup of Chin-moſs three ounces, Aq. hyſterica an ounce: the doſe is a ſmall ſpoonful in the evening and morning faſting.*

Or, *Take of tincture of Sulphur two drams, doſe three drops in the evening and firſt in the morniug in a ſpoonful of the Syrup of Cup-moſs.*

To ſome endued with a hot conſtitution, and while they cough their countenance is ſpread with redneſs, or rather blackneſs, I have preſcribed Phlebotomy or drawing of blood with Leeches to two or three ounces with good ſucceſs.

Take Hog-lice living and cleanſed two ounces, powder of Aniſeed a dram, Nutmeg half a dram, fine Sugar an ounce, bruiſe them together, and pour upon them ſix ounces of Hyſſop-water, of Magiſtral Snail-water two ounces, ſtir them together a little, and preſs them out hard: the doſe two or three ſpoonfuls twice a day.

Hitherto of a Cough and its Remedy, while it is only an entrance to a Conſumption; now it remains to treat throughly of the diſtemper it ſelf, having paſſed the limits of this dangerous diſeaſe, and to deſign a method of curing, and the forms of remedies, which are proper to heal an inveterate Cough, when either being neglected, or not eaſily giving place to remedies, it begins to degenerate into a Phthiſis; namely when it arrives to that ſtate, that the blood being diſſolved in its conſiſtence, doth not only pour out the ſuperfluous Serum, but alſo the nutritive Juice, and perhaps the nervous, the Lympha, and other its ſuperfluities on the Lungs, and lodges them within its paſſages; and in the mean time the corruption of the Lungs is ſo much encreaſed, that the little Bladders being diſtended, or many of them broke into one, ſo that a ſolution of continuity or an Ulcer being cauſed, a greater plenty of corruption is daily heaped in; and moreover the matter in that place gathered together, becauſe it is ſuffered to abide there long, putrifies, and for that reaſon doth ſtill more corrupt the Lungs themſelves, and defile the blood flowing through. In this caſe the Therapeutical indications ſhall be chiefly theſe three: *viz.* in the firſt place to ſtop the diſſolution of the blood, which is the root of all this evil, and to make proviſion that it pour not out the matter any longer in ſuch abundance upon the Lungs. Secondly, by expectorating the purulent matter heaped up within the Lungs, and to evacuate it quickly and ſufficiently. Thirdly, to ſtrengthen and dry the Lungs looſned from their unity, or being too looſe or moiſt or otherwiſe infirm, leſt they be daily more and more corrupted, and give more reception to the morbific matter. Every of theſe indications ſuggeſts various intentions of healing, and requires remedies of divers kinds and many ways of adminiſtrations. The chief of which we ſhall here briefly treat of.

Of what ſort the beginning of a conſumptive Cough is.

Three indications concerning its cure.
1. To ſtop the diſſolution of the blood.
2. To draw out the filth from the Lungs.
3. To heal the Lungs hurt.

1. Therefore what the firſt indication ſuggeſts, that the diſſolution of blood may be prohibited, theſe three things (as much as may be) ought to be procured: *viz.* Firſt that the maſs of blood may contain and aſſimilate whatſoever of nutritive juice it may be furniſhed with; and that it be ſo proportioned, that it neither offend in quality nor in quantity. Secondly, that the acidities either generated in the blood, or poured into it from ſome other place, may be ſo deſtroyed, that the blood retaining as yet its mixture or temperament, may not be prone to flowings and pourings out. Thirdly and laſtly, that all the excrements produced in the blood may be derived from the Lungs to other Emunctories and places of Evacuations.

The firſt indication ſuggeſts three intentions of healing.

The firſt intention, that the nutritive juice may be proportioned to the blood and aſſimilated by it.

1. As to the firſt intention of healing, *viz.* that the nutritive Juice may be proportioned to the blood, let it be adviſed before all things, that they who cough and are phthiſical abſtain chiefly from drink, and that they take liquid things in a very ſmall quantity; for that the blood being infirm in its temperament, ſo long as it is not too much imbued with freſh juice, may be able to digeſt ſmall portions, and retain it within its own conſiſtence. Moreover, let that freſh juice conſiſt of ſuch kind of particles, which being mild and thin, may be tamed by the blood, and aſſimilated without any effervescence or heat. Wherefore Aſſes milk, alſo ſometimes Cows or Goats milk; alſo Water-gruel, Cream of Barley, Ptiſan, Almond-milks, and other ſimple

simple nourishments will better agree and nourish more than Flesh, Eggs, and Gelly-broaths, strong Ale, Wine, or any other kind of richer fare. Secondly, that the blood retaining its own temperament, be not easily dissolved into serosities injurious to the Lungs, it behoves that as well the acidities of it self as of other humors mixt therewith, and chiefly the nervous and limpid ones be destroyed: which intention Medicines prepared with Brimstone will best accomplish; which for that cause in this case (provided a hectic Feaver be not present) may be more frequently and in abundance taken. Wherefore the Tincture, the Balsam, the Syrup, the Flowers, and Milk of Sulphur in somewhat a large Dose may be exhibited twice or thrice a day. For the same reason traumatic or vulnerary Decoctions, also Decoctions of the pectoral Herbs commonly so called, also of the Woods, are to be taken instead of ordinary drink. Moreover the Powder of Crabs eyes, Hog-lice, and other things endued with an Alcali or volatile Salt are often administred with great success. The third intention of healing respecting the first indication, *viz.* that the superfluous dregs of the depraved blood, (if they shall be very much predominant) being commanded out from the Lungs, may be discharged by other Emunctories, sug gests very many ways to be used for their dispatch. For besides Phlebotomy, Diuresie, and sometimes a gentle purgation (which take place in all Coughs, yea in the beginning of a consumptive Cough, or Phthisis) hither also ought to be referred Baths, taking in a more warm air whereby they may more freely transpire, also Frictions of the extreme parts, Dropaces, Issues, Blisterings, or Depilatories, Errhines, Gargles, and other private or public sluices either of umors or vapours.

2. *That the acidities of the blood and other humours be taken away.*

3. *That the excrements of the blood be drawn off from the Lungs.*

The second indication in the beginning of a Phthisis, *viz.* that the Consumptive matter laid aside within the Lungs may be easily and daily evacuated, is performed by expectorating Medicines. These are said to operate after a twofold matter, according to which their virtue is conveyed two ways to the Lungs. For of those being taken by the mouth, some immediately dismis their active particles into the *Trachea*, which partly by making the way slippery, and loosning the matter impacted, and partly by provoking the excretory Fibres into Convulsions, do procure expectoration: in which number are chiefly accounted Linctus's and Fumigations. The expectorating Remedies of another kind, which deservedly are accounted more available, do exercise their energie by the passage of the blood. For whereas they consist of such kind of particles which cannot be digested and assimilated by the mass of blood, being spread through the blood, because they cannot be mixt with it, they are presently again exterminated, and so penetrate from the Pneumonic Arteries into the Tracheal passages; where lighting on the matter they divide, and attenuate, and so disturb it, that the little fibres being irritated from thence, and successively contracted while they Cough, the contents of the Trachea and of its little bladders are ejected upwards into the mouth. Medicines proper for this use besides Sulphur and the preparations of it, are artificial Balsams distilled with Oil of Turpentine, Tinctures and Syrups of Gum Ammoniac, Galbanum, Asa fœtida, Garlick, Leeks, and such like yielding a strong scent; from which also Lohochs and Ecclegam's are prepared. And these work both ways, partly by slipping into the Trachea, and partly by entring the Lungs by the circulation of the blood, and assault the morbific matter both before and behind, and so exclude it with the greater force.

Second indication requires expectorating Medicines.

3. What belongs to the third indication, *viz.* that the frame of the Lungs being hurt, or their constitution vitiated, may be either restored or amended; such things are of use as resisting putrefaction do cleanse, heal, dry, and strengthen; to which intent also Remedies prepared of Sulphur, Balsamicks and Vulneraries do agree. Hence some Empirics do not only successfully prescribe the Smoak of Sulphur vivum, but also of Auripigmentum, to be suckt through a Pipe or Funnel into the Lungs. Moreover it is for this reason, that change of air and soil, *viz.* from Cities to the Country or sulphureous air, or the passage from one Region into another that is hotter, is of such a signal advantage.

Third indication is performed by Balsamicks and vulneraries.

Hitherto of the Method of Healing, which seems to be of use against the more painful Cough, or Phthisis beginning; now it remains according to all those curatory indications to subjoin certain select Forms of Medicines, which also, according to the way of healing described above in a slight Cough which is short of a Phthisis, we shall distinguish into certain ranks, *viz.* which are Mixtures, Linctus's, Lohochs, Tinctures, Balsams, Troches, Lozenges, Powders, Pills, Decoctions, and distilled Waters. We shall set down some Examples of each of these: whereto also may be referred some of the forms of Medicines before described for a beginning Cough, and not as yet consumptive.

Forms of remedies for a consumption.

PHAR. Part. II.

1. Magisterial Medicines and Syrups.

Mixtures.

Take of our Syrup of Sulphur three ounces, water of Earth-worms an ounce, tincture of Saffron two drams, mingle them. Take one spoonful at night, and first in the morning.

Take of Syrup of the juice of Ground-Ivy three ounces, Snail-water one ounce, flour of Brimstone a dram, mix them by shaking. The Dose one spoonful at night and morning.

Take of tincture of Sulphur two drams, Laudanum tartarizated a dram, Syrup of the juice of Ground-Ivy two ounces, Cinnamon-water two drams: the dose one spoonful at bed-time, and if sleep be wanting, towards morning.

Syrupus Diasulphuris.

Syrups.

Take of Sulphur prepared after our manner half an ounce, best Canary wine two pints, let them be digested 28 hours in a water or sand Bath; which being done, take of the finest Sugar two pounds dissolved in Elder-flower-water, and boyl to a height to make tablets: afterwards pour to it by little and little Wine coloured with Sulphur and warm, let it boil a little on the fire, strain it through Woolen. You will have a most delicate Syrup of a gold colour, and for Coughs and other Distempers of the Lungs (where a Hectic Feaver and heat of the Præcordium is absent) most profitable: the dose a spoonful morning and evening by it self or with other Pectorals.

Syrup of Garlick.

Take ten or twelve cloves of Garlick stript from the little skins, and cut into slices, Aniseeds bruised half an ounce, Elicampane sliced three drams, Liquorish two drams, let them digest for two or three days in a pint and half of Spirit of Wine close and warm; strain it clear and hot into a silver dish, and add a pound and a half of fine Sugar, the dish standing upon hot coals, let the liquor be fired, and while it burns stir it; and strain it through woollen, and keep it for use.

Syrup of Turneps.

Take Turneps sliced and fine Sugar of each half a pound, put them in a glased pot a lay of Turneps and a lay of Sugar, the pot being covered with paper, put it into an oven to bake with the bread; when it is taken out, press the liquor, and keep it for use: the dose one spoonful morning and evening.

Syrup of Snails.

Take fresh Snails with their shells n. xl. cleanse them with a Linnen cloth, afterwards each being run through with a bodkin, let the open shell be filled with powder of Sugar-candy, and being put in a linnen bag, let them be hung in a cellar, it will dissolve into a Syrup and drop into a glass vessel set under it: the dose one spoonful twice or thrice a day in a convenient vehicle, viz. Milk-water or pectoral Decoction.

2. & 3. Linctus's and Lohochs.

Linctus's.

Take of conserve of red Roses three ounces, of our tincture of Sulphur two drams, mix them in a glass mortar: the dose the quantity of a Nutmeg evening and morning. To this sometimes to appease a troublesom cough add from half to a dram of powder of Olibanum.

Lohoch.

Take conserve of red Roses four ounces, flour of Brimstone four scruples, fine oyl of Turpentine a dram, powder of Fox-lungs three drams, Syrup of the juice of Ground-Ivy as much as will suffice to make a soft Lahoch, to be taken after the same manner, viz. morning and evening; also to be licked at other times with a Liquorish-stick.

Take powder of Sugar-candy four drams, tincture of Sulphur two drams, mix it in a glass mortar: take it after the same manner.

In the place of Tincture of Sulphur may be administred other Balsamic Tinctures, *viz.* Balsam of Peru, Opobalsamum, Gum of Ivy, Guajacum, Amber, with many other, which either may be mixt with Conserve of red Roses, or with the Conserve of the flowers of Colts-foot, or with Sugar-candy.

4, 5. *Tinctures* and *Balsams* of the same nature and composition, but in a larger Dose are convenient in a Phthisis, which we have above prescribed for a beginning Cough.

Tinctures.

Take of Tar an ounce, Lime-water thrice cohobated two pints, distil it in a Bath to half; afterwards being filtrated, let it be drawn off to the consistence of Honey in Balneo; to which

pour

pour half a pound of tincture of ſalt Tartar, let it digeſt in a cloſe glaſs to extract the tincture: the doſe from 20 drops to 30 in a fit vehicle. After the ſame manner is prepared the tincture of the black oyl of Soot, liquid Amber, liquid Storax, and many others. PHAR. Part. II.

Take of our prepared Sulphur an ounce, adding Mirrh, Aloes, and Olibanum in treble quantity, draw off a tincture with oyl of Turpentine, alſo with rectified ſpirit of Wine: doſe from 15 drops to 20.

6, 7, 8. *Troches*, *Lozenges*, and *Powders*, becauſe they chiefly reſpect a Cough, are almoſt of the ſame nature and compoſition with thoſe before-deſcribed for a new Cough; unleſs that for the drying and healing of the Lungs things ſulphureous and Vulneraries are required in a greater proportion.

Take powder of the leaves of Ground-Ivy a dram, flour of Brimſtone two drams, of Sugar penids a dram and half, with juice of Liquoriſh diſſolved in Hyſop-water make troches of the weight of half a dram. *Troches.*

Take of Yarrow bruiſed and dried in the Sun half a dram, flour of Brimſtone, Olibanum, of each a dram; powder of dried red Roſes half a dram, Sugar diſſolved and boiled to a height ſix drams, oyl of Aniſeeds a ſcruple and half, make Lozenges of half a dram weight: take one three times or oftner in a day, and eſpecially evening and morning. *Powder.*

9. Pills.

Take a pint of the juice of Ground-Ivy clarified in the Sun, flowers of Colts-foot dried, the tops of Hyſop, Sage, Pennyroyal, each a handful; Aniſeed, Caraway-ſeeds, ſweet-Fennel-ſeeds bruiſed, each half an ounce; diſtil them in Balneo Mariæ to half; ſtrain it and diſtil it to the conſiſtence of Pills, by adding half a dram of juyce of Liquoriſh, powder of Elicampane, flour of Brimſtone, each three drams; flowers of Benzoin a dram, Balſam of Peru *half a dram, tincture of Sulphur three drams, tartarizated Laudanum two drams: make it into a maſs, and form it into ſmall Pills to be taken three or four evening, and firſt in the morning.* *Pills.*

10. *Decoctions*, as I have above preſcribed for a ſtubborn Cough, are uſed with ſucceſs againſt a beginning Phthiſis. In a caſe almoſt deſperate I have preſcribed the following Decoction to be taken twice a day, and alſo inſtead of odinary drink with very good ſucceſs. *Decoctions.*

Take Lignum vitæ four ounces, China, Saſſaphras, each two ounces; of all the Sanders each an ounce, ſhavings of Ivory, Harts-horn, each three drams: infuſe them, and boil them in twelve pints of Spring-water to half, adding Liquoriſh an ounce, Raiſins ſtoned four ounces: ſtrain it.

11. *Diſtilled Waters*, ſuch as we have before preſcribed, are ſpecific here, whereto may be added Solenander-water, of Hogs blood and Turpentine; alſo Balſamic Waters diſtilled from Turpentine with Pectoral Ingredients. *Diſtilled Waters.*

Take leaves of Ground-Ivy, white Horehound, Hyſop, Pennyroyal, each three handfuls; roots of Elicampane, Orris of Florence, *each two ounces; Turpentine diſſolved in Oyl of Tartar four Ounces, Hyſop-water four pints, Malaga wine two pints; diſtil them in a ſand Bath: let all the liquor be mixed, the Oyl ſeparated: the doſe two or three ſpoonfuls twice aday, with a ſpoonful of Syrup of Ground-Ivy.*

12. *In the laſt place* we muſt deſcribe the forms of Vapors and Fumes; the adminiſtration whereof doth uſe to profit more than any other remdies in a Phthiſis not yet deſperate, for that they arrive at the very Lungs, and ſo purge them by an immediate affect, dry them, and keep them from putrefaction, ſtrengthen and open all their paſſages, 1. Therefore a moiſt ſteam may be made after this following manner. *Fumes and Vapours.*

Take leaves of Hyſop, Ground-Ivy, white Hore-hound, each two handfuls; Elicampane two ounces, Calamus aromaticus half an ounce, Aniſeeds, and Caraway-ſeeds, each an ounce: boil them in a ſufficient quantity of Spring-water: let the vapor of the hot ſtrained liquor be drawn by the Lungs through a paper rolled up like a cone or funnel: and uſed morning and evening for a quarter of an hour. *Formules of the former.*

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2. A fumigation or dry vapour, is made one while more mild out of meer Balſamics, another while more ſtrong out of Sulphurs, and ſometimes out of Arſenicals.

Forms of the more gentle Fume.

Take of Olibanum, white Amber, Benzoin, of each two drams, Gum Guaici, Balſam of Tolu *of each one dram and half, powder of red Roſes, and red Sanders, of each one dram to be ſtrewed upon burning coals.*

Of the more ſtrong.

Take Gum of Ive, Frankincenſe, of each two drams, Flower of Brimſtone one dram and half, Maſtich one dram, with a diſſolution of gum Tragacanth, form Troches.

Arſenicals.

Take of white Amber, Olibanum, of each two drams, prepared Orpiment half an Ounce, Styrax, Labdanum, of each one dram and half, with ſolution of Gum Tragacanth, make Troches for fumigation.

Smoak of Auripigment.

Mountebanks do ordinarily preſcribe the ſmoak of Arſnick to be ſuckt into the mouth, like Tobacco kindled in a Pipe, and ſometimes with good ſucceſs: Moreover it is in practice with the Vulgar, to burn like Tobacco in a Pipe little bits of cloth ſtained with Arſenick (ſuch as wherewith the walls of Taverns are hung) and ſo ſuck the ſmoak into the conſumptive Lungs for cure.

Of a confirm'd Conſumption.

3. Theſe things being thus unfolded concerning a Cough, and a Phthiſis beginning, both as to what belongs to the Pathologie, and cure; it remains now laſtly to diſcourſe of a more painful Phthiſis confirm'd, and almoſt deſperate; and to conſult what is to be perform'd, when the Lungs being very much vitiated and affected with one or more filthy ulcers, neither the air nor the blood do rightly paſs through them, but choak or corrupt the maſs thereof, by continually ſuggeſting filthy corruption; inſomuch that a hectick feaver and an Atrophie, by reaſon of nouriſhment being fruſtrated infeſt the diſeaſed, with the loſs of all their faculties, and by daily weakning their ſtrength precipitate them to the grave. The moſt certain ſign of this diſeaſe growing deſperate, uſes to be accounted a pain very troubleſome with an inflammation of the throat; for this ſymptom argues a great putrefaction of the Lungs from whence the putrid *effluvia*'s exhaling are thrown about in the narrow paſſage of the throat, which wound and grievouſly irritate thoſe tender fibres there. In this caſe the cleanſing of the Lungs, as alſo the drying up of the Ulcer are in vain deſigned: for all hotter Medicines ordain'd for thoſe purpoſes, and fit enough in the beginning of a Phthiſis, are not to be endured in a confirmed one; inaſmuch as augmenting the inflammation of the Lungs they procure a hectick feaver, thirſt, watchings, and other more painful ſymptomes, or call them back afreſh. For truly in ſuch a ſtate of this diſeaſe where onely the prolongation of life is propoſed with a little toleration and an eaſie death; thoſe remedies help chiefly, which bridle the fervour of the blood, allay the heat in the *Præcordia*, and reſtore the ſpirits, and gently cheriſh them. Hence for food, Aſſes Milk, alſo Water-gruel, Barly-broths, Cream of Barley; and for drink, Ptiſan, Emulſions, water of milk diſtilled with Snails and temperate pectoral herbs, are uſually of greateſt ſucceſs. Syrups and Linctus's, which appeaſe the inflammation of the Throat and Lungs, and facilitate expectoration, but chiefly the more mild Hypnoticks, whereby moderate reſt may be procured, may be frequently or daily taken. The forms of theſe are common enough; but however according to our method we will annex ſome of the more ſelect of each kind.

The formal reaſon thereof.

Forms of remedies in a deſperate Conſumption.

Decoctions.

Take of Barly half an ounce, candied Eringo roots 6 drams, parings of Apples one handfull, Raiſins ſtoned two ounces, Liquoriſh three drams, boyl them in three pints of ſpring-water to two, make a Ptiſan to reſtrain thirſt: take it 3 or 4 times aday, alſo in the room of ordinary drink if it agree.

Take the tayls of twenty Creviſes, candied Eringo roots one ounce, a cruſt of white-bread, Raiſins ſtoned two ounces, Liquoriſh 3 drams, boyl them in 3 Pints of Spring-water to two, ſtrain it, and take 3 or 4 ounces three times aday. After the ſame manner is prepared the Decoction of Snails.

Diſtilled waters.

Take of Snails half-boyled and cut three pound, ground-Ivy 6 handfuls, Nutmegs ſliced numb. 6. crum of white-bread two pound, freſh milk 8 pounds, diſtill it in a Pewter Still. The ſame way is diſtilled the water of Creviſe-tayls. The doſe 3 or 4 ounces three times aday, ſweetned with pearl'd Sugar or Sugar of Roſes.

Hypnoticks.

Take ears of green Wheat as many as convenient, diſtill them in a common ſtill; drink three or four ounces three times aday, ſweetn'd with pearl'd Sugar.

Eclegmas.

Take ſyrup de Meconio *three ounces, water of green Wheat 6 ounces, mix them, drink two or three ſpoonfuls at bed-time, every or every other night.*

Take Conſerve of Mallow-flowers wild or garden three ounces, Lohoch de pino *two ounces*

ces, Syrup of Jujubes two ounces, make a Lohoch, of which take often a dram and half, or two drams. PHAR. Part. II.

What hitherto we have diſcourſed of concerning a Cough of every kind (whether it be ſolitary and ſimple, or the forerunner and companion of a Phthiſis) alſo what is to be preſcrib'd in every caſe touching the method of healing, it would be eaſily illuſtrated by the hiſtory of Cures, or by the Anatomical obſervations on thoſe that have dyed by that diſeaſe. For inſtances of this ſort, and very many examples are every where had, and happen daily ; it pleaſes us here to annex a few of the more ſelect out of the large choice of theſe, accommodated to the chief kinds of a Cough, and Phthiſis. And firſt I will endeavour to illuſtrate the type of a ſimple Cough by one hiſtory or two, and which takes its riſe of it ſelf, and is altogether void of the ſuſpicion of a Phthiſis.

The Hiſtory of a Cough threatning a Conſumption.

It is now many years ſince I took care of the health of a certain Student, obnoxious to a Cough from his tender years, and who was wont frequently to undergo the more painful affections of it, and thoſe of long continuance. This perſon ſeemed of a melancholick temper, of a ſharp wit, of an indefatigable ſpirit, of a conſtitution indifferently ſtrong, but that his Lungs originally being infirm, did ſuffer when the blood diſſolv'd into ſeroſities. In Summer as long as he tranſpired freely, he lived healthily enough ; but in the Spring and Autumn, when the blood changing its temperament, thoſe ſerous fluxes came upon him either of their own accord, or from any ſleight occaſion, he fell eaſily into a Cough with abundant and thick ſpittle ; notwithſtanding this diſtemper frequently within ſix or ſeven dayes, as ſoon as the maſs of blood was purged throughly by the Lungs, vaniſhed leiſurely without any great uſe of remedies. But if to the aforeſaid occaſions of this diſeaſe were added ſome ſtronger cauſes, as chiefly the obſtruction of the pores, and errors touching his diet, ſometimes a more prodigious and ſtubborn cough, neither preſently nor eaſily yielding to remedies, and threatning nothing leſs than a Phthiſis, did come upon him ; then manifeſtly the patient for the firſt days ſuffered light ſhiverings in his whole body, and the ſenſe of a Catarrh in his *Larynx* ; afterwards by frequent coughing with thin ſpittle, together with a giddineſs, he was afflicted with numneſs of his ſenſes, and a dropping at his noſtrils.

In this ſtate his beſt remedy was wont to be, and frequently tryed with ſucceſs, to drink a little more freely generous Wine, and any other liquor very ſparingly : for ſo the acidity and fluor of the blood being ſuppreſſed, and tranſpiration procured more freely, he was much eaſed, and ſometimes recovered health in a ſhort time. Moreover at night and early in the morning he was uſed to take ſeven or eight drops of the tincture of Sulphur in a ſpoonful of Syrup of Violets, or of the Juice of Ground-Ivy, or

Take Conſerve of red Roſes three ounces, ſpirit of Turpentine two drams mingled, the doſe the quantity of a cheſnut evening and morning.

If that theſe remedies together with the *Canary* Antidote and thin diet effected little, the diſeaſe not being ſo cured, ſpinning out into a long period, and preſſing him ſharply for many weeks, yea ſometimes months, it reduced the ſick to a remarkable leanneſs, and to the very brink of the Grave. For then the Cough daily encreaſing and being very troubleſome, did very much impede and break his ſleep, his ſtrength languiſhed, his appetite was dejected, heat and thirſt moleſted him ; in the mean time ſpittle every day encreaſed, and was caſt forth in great plenty ; ſo that not only the *Serum* of the blood, and the recrements, but alſo the nutritive Juice, and the drainings of the ſolid parts being continually poured out upon the Lungs, turn'd into corruption, which was abundantly cough'd out ; moreover his breath was difficult, his joints very infirm, and his fleſh very much conſumed.

When of late our Patient laboured after this manner, we preſcribed the following method, and remedies, by the continued uſe whereof at length he recovered his health. Firſt of all, a thinner diet being appointed him, and for the moſt part Ale being forbidden altogether, he took twice in the day of the following Apozeme about ſix ounces warm, and a little at other times cold to reſtrain his thirſt.

Take of the roots of China two ounces, Sarſaparilla three ounces, white and yellow Sanders of each one ounce, Ivory and Harts-horn of each three drams ; infuſe and boyl them in 8 pints of water to half, adding Raiſins of the Sun 3 ounces, Liquoriſh 3 drams, ſtrein it, and keep it for ordinary drink.

Take

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Take Tincture of Sulphur three drams, take from seven drops to ten, at night and in the morning, in a spoonful of Syrup of Violets, or of syrup of the juice of Ground-Ivy.

When he began by continual use to nauseate this Medicine, in its place the following Eclegma was appointed.

Take conserve of red Roses three ounces, spirit of Turpentine two drams, mix them; the dose is one dram, at the same hours.

Afterwards instead hereof the following Powder was sometimes taken.

Take of the powder of the leaves of ground-Ivy dryed in the Summer Sun three ounces, Sugar-candy half an ounce, mix them, the dose half a spoonful twice in a day, with three ounces of the following water.

Take Ground-Ivy 6 handfulls, Hyssop, white Hore-hound, of each 4 handfulls, Lambs-lungs half-boyl'd and cut small, pour upon them eight pound of Posset-drink made with small ale, distil it in common Organs, the liquor being mixed, let it be sweetned to the taste as it is used with Sugar-candy or syrup of Violets.

Troches. To appease his almost continually troublesome Cough, he swallowed the following Troches, and sometimes a little of the extract of Liquorish.

Take of the species of Diatragacanth. frig. 3 drams, Annise, Carue, sweet Fennel-seeds, of each half a dram, flower of Brimstone two scruples, flowers of Benzoin one scruple, extract of Liquorish dissolv'd in Hyssop-water; make a paste which form into Troches. Or,

Take of Species Diaireos, è pulm. Vulpis, of each two drams, flower of Sulphur, of Elecampane, of each half a dram, Oyl of Annise seeds ℈ß. Sugar dissolv'd in a sufficient quantity of Penniroyal-water and boyl'd to a body ℥vj. form Lozenges of half a dram weight, let him eat one, swallowing it by degrees, as oft as he will.

In the midst of this course, although he was endowed with a weak pulse and more cold temperature, we breath'd a vain in his arm: moreover, with these remedies, the chiefest help accrued to him from the open air, which for the most part he daily enjoyed, either by riding on Horse-back, or in a Coach; for from hence he first began to recover his appetite, his digestion, and sleep; whereto afterwards a relaxation of the other symptoms did sensibly follow, till at length he recovered his entire health. As often as he was afflicted since then with a stubborn and tedious Cough, he used a method like this, and with the like success; and now although he lives altogether exempt from that distemper, notwithstanding he is constrained to decline carefully all occasions or causes whereby either the pores might be shut, or the flux of blood or its precipitation into serosities might be provok'd; which were chiefly his going by water on the *Thames* at *London*, and drinking of acid liquors, as Cider, French or Rhenish wine.

From the above-mentioned history, you may easily conceive both the means and the reason of healing of the Cough, (which caused by the fault of the blood, is without the limits of a Phthisis): The other follows, which illustrates the nature of the same distemper, when it chiefly proceeds from the nervous juice.

The second remarkable History.

A hooping Cough.

A Boy about ten years of age, of a hot temper and fresh countenance, from his infancy obnoxious to a frequent Cough, in his succeeding years sustained more grievous and lasting fits and assaults of this distemper, and by turns was used to labour with a strong and shrill Cough, without spitting, which almost continually afflicted him day and night, and so infesting him many days, yea weeks, brought the sick to utter weakness. Afterwards the period of his disease being come (which happened not but by consuming the store of the morbific matter) he again in a short time became healthy enough, and very free from any sickness of the Thorax: till the morbific matter (as it seems) being heaped again to great abundance, without any evident cause, the same distemper returned and performed its Tragedy with its wonted fierceness. About its first beginning the Cough was troublesome only morning and evening: afterwards the evil by little and little increasing, he almost continually coughed whole days and nights, and if at any time sleep happening of it self, or by the use of Anodynes, afforded any truce, a more outragious fit of coughing succeeded his wakening. After this manner most frequently and fiercely coughing without any spittle, he laboured for three or four weeks, till he was brought to an extreme leanness and weakness; and then the sickness leisurely remitted, so that he coughed somewhat seldomer, and enjoyed moderate sleeps;

sleeps; afterwards in few days growing very hungry, being quickly made full of flesh and vigorous, he recovered his former health in a short time. Fits of this kind more seldom infested him in Summer-season, but in the rest of the year, repeated three or four turns, and brought the sick even into great hazard of life.

If disquisition be made of the nature, causes, and formal reason of this unwonted and as it were irregular kind of Cough, it is manifest it proceeds like all others, from the provocation of the Lungs; nevertheless as to the matter exciting, its seat, and manner of affecting it is doubted: because neither thick spittle nor plentiful thin (as is usual in other distempers) is here cast out; neither doth the Patient complain of feeling a Catarrh, nor of any weight of the Lungs. Wherefore, not as in a common Cough, does the serous humour either slowly or plentifully sweating out of the Trachea or Pneumonic vessels into the little bladders or Pipes of the Trachea, induce the afore-mentioned symptoms: But it is plain from thence that the passages of the *aspera Arteria* are wholly empty of the serous or thick humour, because the deep and sounding Cough throws off nothing. Moreover, neither from the blood impacted in the Membranes of the Lungs, doth this Cough take its origine, because neither feaver, nor thirst, nor pain, are present here as in a Peripneumonie. Besides, neither doth the morbific matter seem to adhere to the nerves or muscles appointed to the function of breathing; because then besides a Cough, Asthmatical or otherwise convulsive fits would sometimes urge with a sense of a strangling; which notwithstanding did not happen to our Patient.

Having frequently and seriously meditated about the Ætiologies of this very difficult case, I am at length induced to think, that a certain serous and sharp matter, as being loaded with a scorbutical taint, falling from the head by the passage of the nerves, doth enter into the nervous Fibres and Membranes of the Lungs or Trachea; which cleaving thoroughly to them, is by degrees encreased to a fulness, and at length being chaf'd, and grown turgid with a perpetual provocation, creates so troublesom a Cough. We have in another place declared the matter of this kind impacted in the Coats of the guts, and the neighbouring parts about them, not rarely to excite a scorbutical Cholick, for many days, yea sometimes weeks, infesting them with vomiting and most sharp torment; and what else is this Cough, but a certain Convulsive Distemper of the Lungs, whose taint notwithstanding, according to the capacity of the part labouring, is impress rather and more on the motive, than on the sensitive Power. For the Lungs however twicht and hurt, do suffer small pain, or scarce any at all; notwithstanding from any light occasion, they are invaded by storms and fits of Coughing. Indeed we compare this distemper of coughing so much the rather to the Cholick, because the subjects of either of them, that is to say, the Trachea, and the guts, as to their coats, vessels, little fibres and glandules, are after the same manner fashioned.

The conjunct cause of the Disease.

The chief cause of the Cough now described, depends upon the morbific matter heaped together within the little fibres of the rough Arteries to a provoking fulness; wherewith when they are loaded, first a quick and painful breathing infests only, with a mornings Cough; because from the beginning only some small portion of that matter being disquieted provokes the part: afterwards when the whole mass thereof growing turgid, almost perpetually twitches the fibres, there follows a most troublesom Cough; which also being often repeated, endures a long season; because the Morbifick mass impacted in the parts affected, is neither presently cast off by the strength of nature, nor easily gives place to any remedies.

For in all the fits of this Disease, I have made tryal of various methods of curing, and of Medicines of divers kinds, though with little success. That distemper beginning at any time, is wont to make a long period, maugre all remedies. The medicines commonly called Pectoral, as Syrups, Lohochs, Eclegma's, or Lambitives, have conferred little benefit to its cure; notwithstanding sometimes it hath seemed good to admit of them into use for this purpose, that they might make slippery and moisten the Lungs, lest they run the hazard of being rent by a violent Cough, and their vessels burst asunder: for sometimes a more fierce fit troubling our sick Patient, he hath been wont to Cough out a little blood, though no thick spittle.

A gentle Purge both in the beginning and declination of this Distemper hath succeeded well. Opening and diuretical Apozemes are ever administred with success, both which he used enough through his whole course instead of ordinary drink. Evening and Morning he took some drops of the Tincture of Sulphur with the Milk-water of Snails; late at night I was sometimes constrained to administer a Dose of Diacodion or of liquid Laudanum: his belly for the most part loose enough, that it seldom required Clysters: in two of his fits he breathed a vein, whereby nothing of success ensued.

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In the laſt fit, beginning about the Autumnal Equinoctial, which paſſed away a little more lightly and gently, this following method of healing was obſerved.

The uſual method of curing.

Firſt of all this Purge was given, and after four days repeated. *Take of Mercurius dulcis ten grains, Reſine of Jallop four grains, mix and make a powder to be taken in a ſpoonful of Syrup of Violets.*

A Drink.

Take China-roots ſliced a dram, Graſs-roots three ounces, Chervil an ounce, candid Eringoes ſix drams, ſhavings of Ivory, Harts-horn, each three drams; Raiſins of the Sun ſtoned three ounces: boil theſe in three pints of Spring-water to two pints, ſtrain it and uſe it for ordinary drink.

A Mixture.

Take Syrup of Jujubes two ounces, Diacodion an ounce, ſpirit of Salt Armoniac with Gum Ammoniac a dram, mix them: the doſe a ſpoonful at night and early in the morning. He was much relieved with this Medicine, notwithſtanding he took it only every other or third day, and for change ſometimes a doſe of the tincture of Sulphur with ſyrup of Violets.

The Diſeaſe declining a Purge was twice repeated, and afterwards, recovering his health by degrees, within two weeks he became healthy enough. But when I beheld him not only obnoxious to frequent relapſes of Coughing, but every fit to be irreſiſtible when it aſſaulted him, and its ſtay very long notwithſtanding the uſe of remedies, and all this threatning no leſs than a Phthiſis at length; I adviſed that as well for his preſervation, as for the more eaſie Cure of the Diſtemper, if it ſhould return, he ſhould travel into a hotter Region. Hereupon he did not much delay, but ſails into *France* about the beginning of *November*, and from thence by a ſtrait journey to *Montpelier*, where abiding half a year he was ſick only twice and both times lightly: afterwards returning into *England* quite free from a Cough, praiſe be to God he enjoys his perfect health.

SECT. I. CHAP. VII.

Of Spitting Blood.

HItherto of a Cough and Phthiſis, as well in its beginning as confirmation; which are the moſt common affects of the Lungs, and moſt eſpecially dangerous. Beſides which there are many other Diſeaſes of thoſe parts that do occur, which when they are not at all, or not ſeaſonably enough Cured, for the moſt part degenerate into a Phthiſis. Theſe paſſions, or at leaſt the chief of them, (as we have before hinted) are ſpitting of blood, an Impoſtume, or Ulcer of the Lungs, a Peripneumony, Empyema, a Pleuriſie, a Tumor of the Lungs, and obſtructions by reaſon of things divers ways concreted, *viz.* ſometimes little Puſtles and Scirrhus's, another while gravel and little ſtones, and ſometimes other preternatural matter; and laſtly hitherto belong an Aſthma and convulſive diſtempers of the Breaſt. Of theſe we ſhall treat in order, and firſt of Spitting blood.

Spitting blood a diſtemper very frequent.

The ſpitting blood out of the Lungs, and the ejections thereof by Cough ſometimes leſs and almoſt none, another while more violent, is a Diſtemper frequent enough, and truly an admiration it is, that it happens not more frequently. For whereas the veſſels bringing blood are divided into twigs and innumerable ſlips, and thoſe very ſmall; and whereas the blood even fiercely boiling, is violently conveyed through them all, complicated after divers manners and variouſly intorted; we can hardly conceive how the circulation thereof being ſo perplexed and intricate, and alſo ſo impetuous, ſhould be performed without ſome impediment and interruption. And truly we conclude it to be very difficult in living bodies, becauſe it hardly ſucceeds by injection in the dead: for as much as liquor ſent through the entrance of the Pneumonic Artery, will not readily and eaſily return by the Veins; but ſticking longer in the paſſage, and Skipping over the uſual paſſages, variouſly runs out into the little bladders and other canals of the Trachea, and into the interſpaces and other various gaps of the little Lobes.

Three things to be conſidered concerning it.

Concerning an Hæmoptoſis or ſpitting blood we are to conſider, firſt out of what veſſels, and by what diſtemper the blood burſts out; ſecondly in what places moſt frequently laid up; thirdly by what means it is wont either to be ejected or brought upward, that it may be diſcharged by the mouth.

Out of what veſſels the blood burſts out.

As to the firſt, we are to ſuppoſe by the Law of Circulation, that the blood of it ſelf burſting out, doth altogether proceed from the Arteries: for the Veins, as long as they remain whole, do reduce it towards the Heart, and not at all pour it out; although we deny not that ſometimes they being hurt by a wound, fall, bruiſe, or ſome violent accident, ſo as to be looſned from their unity, do let go the blood out of their cavities. Nevertheleſs the blood moſt commonly cauſing an Hæmoptoe or blood-ſpitting, proceeds

ceeds from the little mouths of the Arteries being open or torn; and then the fault is wont to be either in the ill temperament of the blood, or ill framing of the veſſels. PHAR. Part. II.

Of either of theſe there are various kinds and differences, which alſo concur after a diverſe manner to provoke the ſpitting of blood. For the blood being ſometimes more thin and alſo ſharp, it unlocks or corrodes the mouths of the little Arteries; and ſometimes again being more thick and prone to coagulate, when it cannot readily enough be received by the Veins, it is extravaſated. By reaſon of theſe faults in the blood, they who labour with the Scurvy or with a peſtilent Feaver, as alſo thoſe who have drunk ſome ſort of poiſon, do frequently fall into a ſpitting of blood. Neither is this diſtemper leſs wont to ariſe from the fault of the veſſels, in as much as thoſe being too tender or too thin, many times are burſt by a violent motion, as by Coughing, hollowing, leaping, or other vehement exerciſes; or for that being too looſe and moiſt, their mouths open, and ſuffer the blood to break out of its circulation: moreover ſometimes for that the Veins being contracted and wrinkled by cold, do not readily paſs away the blood, but the ſame reſtagnating diſtends the little Arteries, and burſts out of their mouths. *By what fault both of the veſſels and of the blood it happens.*

As to the Arteries out of which the blood breaks, cauſing a ſpitting of blood, it concerns much of what ſort they are, and where they are placed; for beſides that there ariſe notable differences of bloody ſpittle, according as the blood breaks out from a ſmaller or a greater veſſel; and if either of them be placed in the top of the Lungs near the Larynx, or in the middle region thereof among the greater branches of the veſſels, or laſtly in the lower region among the orbicular little bladders: moreover we obſerve, that the Arteries which uſe to void blood, are either of the number of them, which ariſing out of the pulmonary Trunk, do every where accompany the branches of the Trachea; or of thoſe which owning their origine to the Aorta, do cover the coat of the Trachea with a thick branching. *What Arteries chiefly and where placed do void blood.* *Both the Pneumonic and tracheal are in fault.*

For it is apparent (as we have declared before) from the mouths of theſe, as alſo of the Glandules, an unctuous humour ſweats out to make the inner ſuperficies of the Trachea ſlippery: moreover in as much as a ſerous humour diſtils abundantly out of the ſame into the cavity of the rough Artery, a Catarrh ariſes. Wherefore we doubt not at all to affirm, that even from the mouths of theſe being open, meer blood ſometimes ſoaking into the Tracheal paſſages, does propagate a bloody ſpittle, though in quantity very ſmall. I have obſerved many, who without a Cough or any indiſpoſition of the Lungs, have once or twice aday voided one or two bloody ſpittles: which as often as it came upon them, the Patients perceived, either in the bottom of the throat, or on the top of the breaſt a kind of diſtillation; whence immediately by the meer contraction of the Tracheal Fibres, with a Snail-like motion, a little of the fluid blood being mixed thoroughly by flegm, and not at all frothy, is voided: and when ſometimes that diſtemper had laſted for many months, no prejudice enſued from thence, which might bring or threaten the Phthiſis: which would not have come to paſs, if any of the pneumonic Veſſels had been opened. *Spitting blood from the tracheal Arteries.*

2. So much concerning Veſſels voiding blood, and of their divers affections. What belongs to the places wherein the extravaſated blood is depoſited, theſe chiefly and almoſt only are the rough Artery, and the inward cavity the parts thereof. For into this, as into a Jakes, all the filth or ſuperfluities of all the reſt of the paſſages are derived by the utmoſt endeavors of Nature, as far as poſſible, to be preſently ſent out of doors. But if the extravaſated blood be thrown into the interſpaces of the little Lobes, or ſoaking out of the outer Membrane, fall into the cavity of the *Thorax*, it doth propagate an Empyema, and frequently an Impoſthume in that place. But for the moſt part the blood ſubject to fall from the pulmonary courſe, produces various kinds of bloody ſpittle; according as it makes its neſt, either upwards within the cavity of the Larynx, or a little beneath about the intermedial paſſages of the Trachea, or laſtly further within the orbicular little bladders. The firſt diſtemper proceeds alone from the mouths of ſome Artery being opened, which covers the trunk of the Trachea; the next ſometimes perhaps from this cauſe, yet more often from the Pneumonic Arteries themſelves being open or burſt aſunder, which veſſels as they are greater, pour out often a dreadful quantity of blood; the ſpitting out whereof proves plentiful and violent, in regard that the muſcles of the whole breaſt, together with the fibres of the Trachea are much provoked and greatly contracted. But if the ſpring of bloody ſpittle conſiſts in the lowermoſt little bladders; the blood is thrown out more ſparingly, but with a profound, frequent and very troubleſom Cough. *2. In what places the blood is depoſited.* *Either in the Larynx, or in the middle of the Bronchii, or in the orbicular little bladders.*

3. And from hence (which was in the third place purpoſed) the differences of bloody excretion out of the Lungs, and the manifold modes and courſes of bloody ſpittle are made known. For the blood ſoaking into the Larynx, after a ſmall tickling in

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the throat without Coughing or Hawking, doth eaſily and almoſt inſenſibly aſcend into the mouth: and if an extravaſation of this kind of blood happens in ſleep, it preſently flows out of the mouth upon wakening, they being ſcarce ſenſible of it; in as much as the moving fibres of the Trachea being contracted while one ſleeps, have then emptied the blood freſh diſtilled into the mouth. But if from a greater veſſel gaping or burſt about the middle of the Lungs, the blood (which is ever frothy) does break out abundantly into the Tracheal paſſages, this by an outragious Cough raiſed thereby is forthwith caſt upwards with violence and in great plenty; inſomuch that the ſick ſeem rather to vomit than Cough out blood. And finally, if the blood breaking out of the foldings of the veſſels wherewith the orbicular little bladders are encompaſſed, falls down into thoſe little cells, from thence it is diſcharged by turns in leſſer quantity, and not unleſs by a ſtrong and very frequent Cough.

The procatarctic and evident cauſes thereof.

So much concerning the formal reaſon, the conjunct cauſes and differences of an Hæmoptoe: as to what belongs to the primary and evident cauſes, either of them are manifold and various. In the former number are reckoned, firſt an hereditary indiſpoſition of the Lungs, whenas they have originally been weak and ſoft with a ſtraitneſs of the breaſt. Moreover their ill temper from a Cough, Empyema, or Pleuriſie going before, and eſpecially an obſtruction or ill conformation do very much diſpoſe to ſpitting blood, and ſo much the rather, if in ſuch a habit an acrimony or Dyſcraſie of the blood ſhall accrue from an ill courſe of Diet, unwholeſome Air, or by any other means.

The ſuppreſſion of the Menſtrua, the Hæmorrhoids, or blood flowing from the Noſtrils incline moſt to a ſpitting blood. Secondly, among the evident cauſes ought to be reckoned primarily the exceſs either of heat or cold; for when the blood grows above meaſure hot, or the tranſpiration thereof through the Pores of the skin is hindred; thereupon ſwelling after a huge manner, it frequently burſts out of the pneumonick Veſſels. From hence *Hippocrates* long ago obſerved, and as yet it is a vulgar obſervation, That ſpitting blood moſt frequently happens in a winter when the North-wind blows. Neither leſs ſeldom hath the uſe of bathing brought this evil upon many, before the uſe whereof they were healthful enough. Moreover many contract this from drinking of wine and ſtrong waters, from a blow, of a fall, hollowing, vomiting, coughing, or any other violent ſtirring of the whole body or of the Lungs. Alſo certain poiſons, and according to *Heurnius* the Lunar beams (the reaſon whereof doth not eaſily appear, neither doth there remain any credit thereto) are reported to provoke this diſtemper.

The Prognoſtics of this diſeaſe.

The Prognoſtics of this diſeaſe are enough known to the vulgar, whereas there is not any one of them, who doth not ſuſpect the ſpitting of blood as very dangerous. Nevertheleſs whereas the kinds hereof are various, one is found more leſs dangerous than another. The blood ſoaking out of the veſſels of the Trachea is often free from any evil: moreover when breaking out from the loweſt and leſſer pulmonary Veſſels, it often admits of Cure; at leaſt it is much ſafer than a plentiful ſpitting of blood happening from the great branches of the Artery being opened into the Trachea. But the prediſpoſition of the Patient makes a great difference into the Prognoſticks of this diſeaſe: for if blood-ſpitting be provoked by reaſon of a ſolitary evident cauſe, and ſhall happen to a body formerly ſound and well ſet, there appears far greater hope of help, than if the diſtemper ariſing of its own accord ſhall happen to a cachectical, phthiſical, ſcorbutic, or otherwiſe ſickly body. However 'tis a common obſervation, that this diſeaſe is dangerous and always difficult to cure: the reaſon whereof is alſo clearly manifeſt, for as much as the function of the Lungs conſiſting in a perpetual motion, is altogether contrary to the method of healing a wound, whereto primarily eaſe and reſt are required. In like manner this happens to be a greater hindrance to its Cure, in as much as the frame of the Lungs is not a Parenchyma (as was thought) but a texture or very ſubtile web of innumerable veſſels; the unity whereof if once diſſolved, it will be altogether impoſſible, for the ends of the disjoyned veſſels to meet again together, or the ſpace to be filled up with fleſh or callous, as in other parts. But there is this only to be hoped, that while the ends of the veſſels grow together incongruouſly and always imperforated, the circulation of the blood ceaſing in the part diſtempered, may be ſupplied by another neighbouring part: which indeed rarely ſucceeds without hurt or prejudice of the whole Lungs.

The Cure thereof.

As to what appertains to the Method of healing the Hæmoptoe or ſpitting blood, the curative indications ſhall be chiefly theſe two, *viz.* to ſtay preſently and reſtrain the flux of blood; then ſecondly, to heal the diſſolution of unity without any relicts of a Conſumption in the Lungs.

I. Indication.

I. As to the former, theſe two things are chiefly to be procured, *viz.* firſt that blood flow not to the part diſtempered; and ſecondly, that in the mean time the opening of the veſſel may be ſome-how ſhut.

1. That

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1. That the blood may not flow to the part diſtempered, there are many intentions of healing in uſe, *viz.* it will be requiſite to diminiſh the abundance of blood, to reſtrain the boiling thereof, to alter the intemperament, and depreſs its motion or divert it another way: for which purpoſes Phlebotomy, Ligatures, and Frictions are often convenient: alſo Juleps, Decoctions, Emulſions, and ſucculent Expreſſions of Herbs ought to be drunk. Likewiſe moderate Hypnotics, and in the firſt place Diacodiates are exhibited with ſucceſs: for theſe, by reſtraining the motion of the Heart, do force the blood to cool.

1. It ſtops the flux of blood.

2. That the opening of the veſſel may be ſhut, aſtringent and agglutinating remedies are in the firſt place convenient. The chief of theſe are uſed to be exhibited in the form of a Linctus, ſo that while one ſwallows, certain particles gliding into the rough Artery, may more immediately communicate their power to the part diſeaſed. But the reaſon of this operation ſeems not to be of any great moment; becauſe the efficacy of the Medicines themſelves, chiefly and almoſt only by the conduct of blood reaches to the ſeat of the diſeaſe. Wherefore not only Lohochs, but alſo Decoctions, Powders, and Pills of vulnerary and balſamic Ingredients are preſcribed with ſucceſs. The forms hereof we ſhall annex beneath.

2. It ſhuts the opening of the Veſſels.

II. The ſecond indication, which is alſo preſervatory, reſpecting the healing of the diſſolution of unity without any remaining hurt of the Lungs, ought to provide againſt two ſorts of evils, *viz.* leſt the ſpitting blood (whereunto the diſtempered are afterwards always prone) begin again; and leſt a Phthiſis ſucceed, which threatens every body ſubject to the Hæmoptoſis. For theſe ends for the prevention of this diſeaſe daily care and conſtant courſe of healing ought to be miniſtred to the blood and Lungs.

II. The ſecond preſervatory indication.

1. As to the blood, the maſs thereof ought to be contained ever in a due quantity, and a right temperament, with a mild and equal motion. Hence leſt it ſuperabound, or diſtempered with a Dycraſie enter into turgeſcencies, or lodge its impure feculencies in the breaſt: it is requiſite ſometimes to uſe Phlebotomy, and a gentle Purgation. An exact courſe of Diet is always neceſſary. Moreover for the depurating and ſweetning the blood, drinking of Aſſes milk, or of Medicinal waters ſometimes does greatly help. But Decoctions, diſtilled Waters, Juices of Herbs, which carry away the ill temperaments of blood, and derive the Serum and other impurities from the Lungs, and bring them forth either by Sweat or Urine, are to be carefully drunk. Beſides for this purpoſe Iſſues do chiefly conduce.

1. It reſpects the blood which is to be kept in a right Cras.

2. Neither ought there to be leſs care of the Lungs themſelves, namely that the whole frame thereof, and chiefly the place affected, be preſerved in due frame and right tone. Hence every violent motion, whereby its unity is more diſſolved, or the reſtitution thereof hindred, ſhould be induſtriouſly declined. Let the party live in a clear and open air, but not too fierce, or ſharp; let him abſtain from groſſer foods, from Noon-ſleeps, from plentiful Suppers, and other errors in diet, which induce either repletion or obſtruction upon the *Præcordia*. But let remedies be admitted in daily uſe, which by a peculiar property, or certain ſpecifick vertue are reported to heal the Lungs.

2. A due frame of the Lungs to be procured.

The method of healing requiſite for ſpitting of blood, being ſhadowed after this manner, there yet remains as to all the therapeutic indications, and according to the various intentions of healing which belong to them, for us to ſubjoyn ſome more choice forms of Remedies, whoſe Van thoſe deſervedly lead which meeting with the ſymptom moſt urging, do ſuddenly reſtrain the flux of blood caſt out by coughing or otherwiſe out of the Lungs. In the firſt rank of theſe Medicines, thoſe are reckon'd which hinder the blood from flowing to the part affected, and together are impregnate with a certain aſtrictive and agglutinative power whereby the opening of the veſſel may be ſhut; and after the Belly being cleared with a Clyſter, and Phlebotomie (unleſs a weak pulſe and defect of heat withſtand it) made uſe of, there is wont to be given ſomewhat in form of a Julep, Decoction, Emulſion, juicy Expreſſion, Powder, Pills or Lohochs. We will annex certain more elegant and more efficacious Receipts of all of theſe, as likewiſe of Narcoticks, which notwithſtanding ought not every where and indifferently to be uſed, but methodically and ſeaſonably, according to advice of a diſcreet Phyſician, according to the various conſtitution of the Patient and condition of the diſeaſe.

The forms of Medicines.

1. Juleps and *Diſtilled Waters.*

Take of Purſlain and Poppy-water of each 6 ounces, Dragons-blood in moſt fine powder half a dram, ſyrup of red Poppies two ounces, ſpirit of Vriol of Mars ℈ſs. mix them; the doſe ℥ij. repeated once in 5 or 6 hours. Juleps.

Take

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Take of Plantane-water lb. *j. Gum Tragacanth and Arabick powder'd, of each* ʒſs. *mingle and diſſolve them; after adding ſyrup of dryed Roſes* ℥*j* ſs. *make a Julep; the Doſe* ℥*iij. or* ℥*iiij. every third or fourth hour.*

Take of the water of Oak-buds, red Roſes, Water-lillies, of each ℥*iiij. of Blood-ſtone finely ground, Role-Armenick powder'd of each* ʒſs. *ſyrup of Water-lillies,* ℥*ij. mix them; the doſe* ℥*iij. or* ℥*iiij. three or four times aday.*

Diſtilled Waters.

Take of the Dew or almoſt inſipid Phlegm of Vitriol lb. *j. Syr. of Myrtles* ℥*ij. mix them, the doſe* ℥*ij. or* ℥*iij, often in the day or in the night.*

Take of Cypreſs tops M. viij. of the leaves or flowers of Willow M. vj. *the greater Comfry-roots, Water-lillies, of each* lb. ſs. *Pomegranate flowers* M. ij. *All being cut ſmall together, pour on them* lb. viij. *of new Milk; let it be diſtill'd in common Organs, the doſe* ℥*iij. or iiij, often in a day.*

Take of this diſtill'd Water, and of Plantane-water, of each lb. ſs. *Gumm Tragacanth and Arabick of each* ʒ*ij. diſſolve them; the doſe is* ℥*iij. every third hour.*

The following Mixture is preſcribed by Dr. *Frederick Decker*, to be taken a ſpoonful at a time in ſpitting blood, and ſeems a very beneficial one.

A Julep.

Take of Plantane-water ℥*ij. Cinamon-water* ʒ*ij. conf. of Hyacinth* ʒ *i* ſs. *diſtill'd Vinegar* ʒ, *of red Coral prepar'd* ʒſs. *Balauſtins, Dragons-blood, of each* ʒſs. *Laudanum Opiate gr. iij. Syr. of Myrtles* 1 *ounce, mingle them.*

Take of Plantane, red Roſe, & Purſlain-water, of each 4 *ounces of Blood-ſtone & Dragons blood reduced into fine-powder of each half a dram, Sugar-Candy* ʒ vj. *make a Julep.*

A Solution of common Vitriol, or of Vitriol of Mars made in Spring-water, and applyed with a rag to a wound, wonderfully ſtops bleeding, but is ſcarcely convenient to be given inwardly.

2. Decoctions, Tinctures, *and* Emulſions.

Apozems.

Take the leaves of Blood-wort, Periwincle, Mouſe-ear, Plantane, Wood-ſorrel, both ſorts of Daiſies, of each one handful, red Roſe leaves half a handful, Barly half an ounce, Raiſins two ounces, boyl them in three pints of Smith-forge water filtred (or water wherein hot Iron hath been often quencht) to two pints. To the ſtrain'd liquor add two ounces of the ſyrup of the Juice of St. John's *wort, or of Mouſe-ear, make an Apozeme, doſe from four ounces, to ſix, three times in a day.*

Take the leaves of St. John's *Wort, roots & leaves of Tormentil, of the greater Burnet, Meadow-ſweet, of each one handful, of the ſeeds of Purſlain, Plantane, Sorrel, of each one dram, Conſerve of red Roſes half a pound, Spring-water eight pound, boyl them for* 12 *hours in* Balneo Mariæ, *to it being ſtrained add half a ſcruple of the ſpirit of Vitriol of Mars, to be taken as the former.*

Tinctures.

Take of Barly-water with Madder-Roots boyled in it a pound and half, infuſe in it being warm a handful of red Roſe-leaves, adding one ſcruple of ſpirit of Vitriol, after three hours ſtrain it, adding Syrup of the Juice of St. John's *wort one ounce and half, take three or four ounces, three or four times aday.*

Emulſions.

Take of the decoction of the roots of freſh Nettles a pound and a half, white Poppy and Henbane-ſeeds of each two drams, Melon-ſeeds 6 drams, make an Emulſion, ſweeten it with Sugar of Penids; the doſe is three ounces, three or four times in a day.

3. Juices of Herbs and juicy Expreſſions.

Juices of Herbs.

Take of the Juice of Plantane half a pound, take two or three drams three times aday, in three ounces of the diſtilled water preſcribed before; ſweeten it to pleaſe.

Take of freſh Nettles, Plantane, the ſmaller Daiſies, of each 3 handfuls, bruiſe them, and pour upon them of Purſlain-water 6 drams, make an expreſſion, take it as the former.

4. Powders *and* Pills.

Powder.

Take of the powder of Blood-ſtone, Dragons-blood, ground with Roſe-water on a Marble, Pearles, of each one dram, Bole Armenick, and Earth of Lemnos, of each half a dram, Troches of Winter-cherries two drams, make a powder, divide it into twelve parts, one part to be taken three times aday in the former diſtill'd water.

Take of Henbane, white Poppy-ſeeds, of each 10 *drams, ſealed Earth, red Coral, of each* 5 *drams, Sugar of Roſes three ounces, make a powder, the doſe one dram morning and evening*

ming; this compoſition made up with a fit Syrup into a ſoft conſiſtence, was anciently call'd and renowned in Germany, *by the name of* Helideus's *Electuary.* PHAR. Part. II.

Pills. *The aforeſaid Powders with the addition of Gum Tragacanth diſſolv'd, or ſome fit ſyrup, may be reduced into Pills or Lozenges.*

The ſpongious excreſcence uſually growing to the fruit of Hipps or Dog-bryar, reduced into powder, half a dram taken twice aday, is a very profitable remedy in ſpitting blood.

Take of Yarrow bruiſed and dryed in the Summer-Sun as much as you pleaſe, reduce it into powder to be kept in a Glaſs; the doſe from half a dram, to a dram twice aday in any convenient liquor.

Julius Cæſar Scaliger's *Powder, or rather that of* Serapion *is mightily commended. Doſe four drams twice or thrice aday.*

5 Lohochs *and* Electuaries.

Electuaries. *Take conſerve of red Roſes, of Dog-roſe, of each two ounces, powder of white Poppy and Henbane-ſeeds, of each two drams, ſpecies Diatragacanth. frig. one dram and half, of Blood-ſtone, Dragons-blood prepared, of each half a dram, Syrup of red Poppies what will ſuffice to make an Electuary. Take the quantity of a Cheſnut evening and morning, at other times let him lick with a liquoriſh ſtick.*

Lohochs. *Take Conſerve of the greater Comfry flowers, of Water lillies, of each an ounce and half, Troches of Winter-cherries, of Diatragacanth. frig. of each a dram and a half, ſyrup of Jujubes what will ſuffice to make a ſoft Electuary, of which lick often.*

Take of the white of an Egg well beaten two drams, Sugar of Roſes one dram, of white Starch three drams, make a Lohoch to be taken often with a ſpoon.

Take of Conſerve of red Roſes 3 ounces, Leucatell's *Balſam half an ounce, Troches of Winter-cherries two drams, Syrup of red Poppies what ſuffices to make a ſoft Lohoch: the doſe is the quantity of a Cheſnut night and morning.*

The ſecond Indication. II. The ſecond preſervatory Indication exhibits ſuch remedies, which by containing the blood in its right temper, and the Lungs in their due frame, do provide againſt a relapſe of ſpitting blood, and the following of a Phthiſis. Such things which reſpect the blood, either are mild evacuators by Stool, Urine or Sweat; or are meerly Alteratives. Every of theſe are uſually preſcrib'd either in form of Potion, Powder, Electuary, or Pills: We will here ſhew you the moſt ſelect patterns of the chief of them.

The firſt intention in reſpect of the blood.

A Purge. 1. As to Evacuators, a gentle Purgative is ſometimes appointed after this manner.

Take of the beſt Senna three drams, Caſſia Fiſtula bruiſed one ounce, Tamarinds three drams, Coriander-ſeeds a dram and a half, boyl them in Spring water to 6 ounces, to it ſtrain'd add Syrup of Chichory with Rhubarb one ounce, clariſie it with the white of an Egg.

Or,

Take four ounces of Gereon's *decoction of Senna, Syrup of Apples purging one ounce, mingle them and make a potion.*

Alteratives. 2. That the good temper of the blood may be preſerved, and the ſuperfluities drained from the Lungs may be continually diſcharged by Sweat and Urine, theſe following Alteratives, or ſome of them are for the moſt part receiv'd into conſtant uſe; which alſo being endued with a healing power, do ſuccour the weak Lungs, or thoſe whoſe Unity is diſſolv'd.

For ordinary drink, let ſimple water, eſpecially in a hot conſtitution, or being colour'd with a little Claret-wine, be drunk. Thoſe with whom this doth not agree, *a Bochet of China, Sarſa, with ſhavings of Ivory, Harts-horn, with white Sanders,* or *ſmall Beer, or ſmall Ale, with the leaves of Harts-tongue, Oak of Jeruſalem,* and the like infuſed, are frequently uſed with good ſucceſs.

Pectoral Decoctions or Hydromels with temperate Vulneraries are taken twice or thrice aday to ſix or ſeven ounces.

Decoctions. *Take of freſh Nettles, Chervil, of each one ounce, Harts-tongue,* Speedwell, *Mouſear, Ground-Ivy, St.* John's-*wort, of each a handfull, boyl them in three pints of Spring-water, to two pints, adding Raiſins ſtoned an ounce and half, Liquoriſh two drams, to it ſtrain'd*

add

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add Syrup Byzantine two ounces, clarifie it with the white of an Egg, make an Apozeme to be taken from 4 ounces to 6, twice or thrice in a day for a month. In a more cold or Phlegmatick constitution, let the Liquorish and Raisins with the Syrup be omitted, add at last of Honey well clarified two ounces, strain it and keep it for use. The Dose is the same.

The use of these is sometimes intermingled with a distilled water appropriate for that use, which likewise is more frequently taken by such who nauseate and loathe Apozemes.

A distilled water.

Take the tops of Cypress, leaves of Ground-Ivy, of each 6 handfuls, of Snails half boyled one pound and half, of all the Sanders bruised of each one ounce, being cut and bruised infuse them in 8 pound of fresh Milk, distil it in common Organs, the Dose 3 or 4 ounces with a spoonful of Syrup of Ground-Ivy, to be taken twice in a day.

The second intention respects the Lungs.

2. In respect of the Lungs, *viz.* that without obstruction or opening of the vessels, the Union of parts and due conformation of the whole may be preserved, temperate balsamicks chiefly conduce. To this intent *Leucatellus*'s Balsam is commonly prescribed to be taken daily and for a long season. Chymists and certain Noble women do cry up with great praise a balsamick Oyl drawn by distillation, called by them *the Mother of Balsam.*

It would be easie here to reckon up very many other remedies against spitting blood very much celebrated by the ancient as well as by modern Writers; notwithstanding the harvest of these already gathered together doth at present seem rich enough. But it remains, that I illustrate as well the Theory of this disease, as the curatory method above delivered, by a History or two of sick Patients.

The first History.

A noble young man, when after a scorbutical *Cachexia* he was affected with a Palsie, and for curing this disease, remedies not only great but improportionate to the blood and spirits were experimented by him, *viz.* Salivation and the use of Baths, he contracted a spitting of blood, whose fits (of all I ever knew not presently mortal) were most fierce. Presently on the first appearance of this disease, spitting blood followed the Operation of *Hues*'s powder (from which having for some time suffered a flowing of the Mouth, without his Palsie being cured he was reduced to great weakness:) Then being afflicted with a Catarrh, and a Cough very troublesom, he began to discharge a discolour'd Spittle, sometimes stained, and sometimes sprinkled with blood; but this disease being mild from the beginning, did suddenly vanish away by the use of remedies, and after going into the Country, and sucking in a more pure air, he became better, and after a while seeming healthful enough in his breast, he went to the Bath for the benefit of his Palsie; where daily bathing for a fortnight in those hot waters, he again contracted a Cough, and a little after an horrid Hæmoptoe or a spitting of blood, so that in the space of 24 hours, coughing often and plentifully, he poured out blood in a vast quantity.

I first visiting him in this condition, provision being made for the whole, I prescribed presently Phlebotomy for revulsions sake: notwithstanding after this administration (both then and ever after) he either repeated the bloody spittle, or grew worse. Moreover, I exhibited Juleps, Lohochs, Decoctions, and also Hypnoticks, which helping little or nothing, ligatures made about his arms and thighs, did first of all restrain the tyranny of this disease: And when afterwards the Evil broke out again, I perswaded him at length, (his drink of Beer being left) that he should constantly drink the decoction of China and Sarsa with the Pectorals. By the continual use hereof, observing moreover an exact course of diet, and altogether abstaining from wine, more hot Aliments, and Salt, and Sugar, for above two years he was well in health.

But afterwards when by being crouded in a Court of Judicature, he grew mighty hot, he relapsed back again into a terrible spitting of blood. A Physician being sent for, he was presently let blood in the arm, whence his spitting of blood became more sharp; and when afterwards letting blood was repeated the second and third day, and the evil grew worse every time, at length Ligatures (as at first) being administred, and the pectoral drink and a Linctus being often taken, the disease presently remitted, and in a short space wholly ceased, notwithstanding he continued the use of his pectoral decoction and slender diet. *viz.* no flesh-meat, for a fortnight; and from thence he obtained truce from his enemy for three years; and when afterwards at any time the blood swelling by drinking of wine, or taking more dainty food, began to break out from the Lungs, presently by ligatures, and the use of the Decoction and Lohoch, and a thin diet, its assault was wont to be repulsed. But he did not so safely escape, but

that

that it was neceſſary for him for the moſt part to keep perpetual watch againſt that enemy always lurking: for not long ſince by reaſon of the intemperature of the year, he contracted a troubleſom Catarrh, with a Cough, a plentiful ſpittle, and ſometimes bloody, and then the former Medicines effected leſs; wherefore, he betook himſelf by his own advice to new things, and in the firſt place took evening and morning a ſpoonful of Syrup of Ground-Ivy, and thereby enſued a notable help: but when the Syrup became quickly loathſom by reaſon of the Sugar, he took the powder of that herb well prepared half a dram, or one dram twice a day in a ſpoonful of ſome liquor; by the long uſe of which Medicine he was much better as to his Catarrh and Cough. But when the ſpitting of blood now and then broke out, though in little quantity, he chang'd again his Medicine, and took twice in a day the powder of the tops, and chiefly of the hairy excreſcencies of Cynorrhodon or Dog-bryer: which only Medicine a certain Phyſician renowned formerly for the cure of ſpitting blood, uſed with great ſucceſs. Neither did our Patient receive a leſs happy effect from that Medicine, for preſently after he eſcaped altogether free from a Cough, a Catarrh and bloody Spittle, and ſo remained for a long while: until at length believing this diſeaſe of the Breaſt to be wholly ſubdued, and therefore ſlighting it, he aſſumed weapons againſt the other more ancient enemy the Palſie. Wherefore, while his Hæmoptoſis or Spitting of Blood was neglected, he daily took a large doſe of hot Medicines to conquer that other diſtemper, *viz.* magiſtral waters diſtilled with Wine, ſpirit of Harts-horn, of Salt Armoniack, and Aromatick Powders and Confections; Beſides, whilſt he indulg'd himſelf in a more plentiful diet, with a moderate drinking of Ale and Wine, the roaring Lion that at firſt ſeem'd to ſleep, was again ſtirr'd up, *viz.* he had not long continued in that antiparalytical Method, but the Spitting of blood returned with its greateſt fierceneſs, ſo that in the ſpace of a day and a night he coughed out above three pints of ſpumous blood. But afterwards a Phyſician being ſent for who preſently preſcribed Phlebotomy, the ſpitting of blood began to ceaſe upon bleeding (as formerly it was always wont to do) but then fell into ſharp fits again: which however by the uſe of Ligatures, and a Lohoch and pectoral Decoction daily taken, was preſently aſſwaged, and a while after wholly ceaſed. And when afterwards he uſed the pectoral Decoction three months, and a very ſlender Diet, *viz.* without any fleſh, only of Herbs, Barley, &c. and Milk-meats, in a ſhort time he recovered his former health, and now lives in that ſtate, ſo triumphing over that cruel diſeaſe, that many Hæmoptotic perſons conſult him as their Oracle, and for a Cure do propound a method of this kind of living to be followed before the Phyſicians advice.

The reaſon of the caſe.

What is moſt wonderful in this caſe is, that after ſo many breaches ſo often happening in the Lungs, this famous Perſon was not in the intervals affected with a Cough, neither fell afterwards into a Conſumption; whereas moſt after any of the ſmalleſt veſſels being open in the *Præcordia*, for ſome time after labour with a Cough with plentiful and thick ſpittle, and at length frequently become Conſumptive. And that it happened otherwiſe to our Patient, I chiefly attribute to the balſamick conſtitution of his blood, *viz.* in the maſs whereof the ſerous recrements are either leſs collected, or ſo ſtrictly mingled, that they cannot be eaſily ſeparated thence; wherefore after the veſſels were broken, or their unity diſſolved, a plentiful Ichor or ſharp humor (being wont to generate a Cough and ſpittle) did not ſweat out as in many others. Moreover what he himſelf obſerved, contrary to many others, that his ſpitting blood happened never in winter, but in Summer, came alſo ſo to paſs by the ſame reaſon: becauſe when the blood did leſs abound with vaporous recrements, the opening or obſtruction of the Pores were neither an advantage nor prejudice to it; nevertheleſs the blood growing hotter than it ought to be, ſeeing it exhaled not, there was a neceſſity it ſhould break out of the veſſels; and when again diminiſhed in quantity, ſending away little or no ſerous Ichor out of the orifices of the veſſels, the ſpitting of blood ceaſed without a remaining Cough. The ſame reaſon holds of many that ſpit blood, wherefore ſome are found much inclinable, others not prone to a Conſumption. This Gentleman ever found the uſe of the pectoral Decoction advantageous to him: wherefore when he often varied other Medicines he always retained the ſame Decoction: moreover he hath commended it to many others ſpitting blood with ſucceſs. The form of the Preſcription was this.

A Drink.

Take of all the Sanders of each ſix drams, infuſe them for twelve hours in ſeven pints of Spring-water, then boil them to a conſumption of a third part, after add leaves of Colts-foot, Maidenhair, Mouſe-ear, Speedwel, flowers of St. John's*-wort, each two handfuls; ſweet Fennel-ſeeds ſix drams, Liquoriſh half an ounce, Raiſins ſtoned half a pound: boil them to four pints, afterwards ſtrain it, and keep it for ordinary drink.*

Moreover

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Moreover the ſpitting of blood threatning and preſſing upon him, he took thrice or oftner aday the quantity of a Nutmeg of the following Electuary, drinking after it ſeven ſpoonfuls of a Julep.

The Electuary. *Take conſerve of red Roſes three ounces, conſerve of Hips, Comfry, each an ounce and half; Dragons blood a dram, ſpecies of Hyacinth two ſcruples, red Coral a dram, with a ſufficient quantity of ſyrup of red Poppies, mix them and make a ſoft Electuary: let him take hereof evening and morning a dram and half, drinking after a draught of the following Julep. At other times let him lick it with a Liquoriſh-ſtick.*

The Julep. *Take Plantane and Spawn-Frog water, each ſix drams; ſyrup of Coral, dried Roſes, each an ounce; Dragons blood two ſcruples: mix them, and make a Julep.*

Among the examples of them that ſpit blood the caſe of that Reverend perſon Dr. *Berwick* S.T.P. and lately Dean of St. *Paŭls* Church ought not to be omitted, which ſome while ſince I learned partly from the Patient himſelf, and partly was communicated to me from his Brother that moſt skilful Phyſician Dr. *Berwick* my moſt dear Friend.

The ſecond Hiſtory. That moſt renowned Divine fifteen years before he died laboured with a moſt obſtinate Cough, and ſometimes with a bloody and ſalt ſpittle, with a grievous breath ſtinking like Hell; by which being made lean by a pining away of the body, he wanted but little of being almoſt extinguiſhed by a Conſumption. As often as his ſpitting blood intermitted, the rankneſs of breath and ſpittle ceaſed alſo; afterwards the return hereof declared conſtantly that other affect to be preſently attendant. In this languiſhing condition, when this Renowned man was diſcovered to favour the Kings Party at that time oppreſſed with a grievous Tyranny, and being caſt into a ſtrait Priſon, did drink meer water inſtead of ordinary drink, he recovered his health beyond the hope and expectation of all perſons, and ſo remained indifferently healthful for above ten years ſpace. Nevertheleſs afterwards, I know not by what occaſion, unleſs by the hardſhip of a cold winter, not only the aforeſaid evils, *viz.* a Cough with bloody and ſalt ſtinking ſpittle did become fierce upon him, but alſo over and above, a debility of ſtomach, want of appetite, and a nightly Feaver did accrue. But not long after theſe Symptoms a little remitting, fair weather again ſeemed to ſhine out; until on a certain day, the air being ſuddenly changed into an intenſe cold, towards night he was aſſaulted with great ſtraitneſs of breaſt and difficult breathing, with a quick and weak pulſe, and fainting of all his ſpirits, as if he had been expiring. Nevertheleſs from this danger he ſuddenly eſcaped by the interpoſition of a Criſis, *viz.* by a plentiful ſpitting of blood, and after by a breathing Sweat: but from that time his ſpittle remitted much of the uſual ſtench, and ſomething of its ſaltneſs; and when in a ſhort time afterwards the laſt and moſt painful invaſion of ſpitting blood threatned him, that uſual preſage from ſtench of breath was wanting; but the ſubſequent ſpitting of blood being very plentiful, did ſo debilitate his ſtrength, that from that time declining ſenſibly, he expired within a month: and when a little before his deceaſe, by reaſon of a ſharp pain in his ſide, a Vein was breathed, his blood ſeemed to fail ſo, that almoſt none ſtreamed out. Moreover in his body diſſected after death very little quantity of blood was found: nor could they find any footſteps of the other moſt notable Symptoms, *viz.* ſpitting of blood and of the ſtinking breath and ſpittle; for there was no collection of any filth or ſtinking and putrid matter, nor any cavity in the Lungs made by an Ulcer or Wound; but only one lobe of this bowel, or rather the whole left ſide was ſo hardned from a ſchirrhous Tumor, that the blood could not eaſily or but very little paſs through the frame being ſo obſtructed, and as it were ſtony: wherefore it is no marvel, if the blood that ſhould have paſſed moſt ſwiftly through the Lungs, did now and then burſt out in ſome place from the veſſels, which were joined together, or ſuffered not a circulation by reaſon of the Schirroſity.

The reaſons of the caſe. Notwithſtanding here a greater difficulty ariſeth, *viz.* whereas his Lungs were found altogether free from any Ulcer or notable wound, whence that moſt dire ſtench of ſpittle and breath, always a forerunner and companion of the bloody ſpittle (the laſt invaſion of this diſeaſe only excepted) proceeded. We have in another place given remarks upon all theſe things, as that Ulcers of the Lungs and the purulent ſpittle of conſumptive perſons ſeldom or never ſtink, but the matter caſt out of an Impoſthume of the Lungs doth frequently ſtink: but that in the ſick Doctor the Lungs being free from either affect, breathed out ſo horrible a breath, the reaſon will beſt of all appear, if we inquire of the manner and cauſe of a ſtench in general. For we obſerve this to be excited when the impure Sulphur is diſſolved either by a lixivial, or an acid Salt, and is precipitated by the other. Let common Sulphur, or Sulphur of Antimony be diſſolved by Oil of Tartar or Stygian water; afterwards if you pour on this ſolution a diſſo-

lution

lution of fixed Salt, and upon that, Vinegar, a moſt hideous ſtench will ariſe. In like manner we may conceive in the caſe propoſed, that the ſulphureous particles of the blood being very impure, were corroded by the fixt Salt, with which its juice abounded very much; afterwards when the acid humor, having endured a flux, reflows from the nervous parts into the maſs of blood, it precipitates the diſſolved Sulphur, and ſo cauſes that ſtench to be exhaled from the Lungs, and whilſt it forces the blood into a turgency, a little after it compells to a ſpitting of blood. I have known ſome endued with a breaſt firm enough, and free from all Coughs, and conſumptive diſpoſition, who have for the moſt part breathed out a moſt hideous ſtench: which could proceed from no other cauſe, beſides what even now we have obſerved. The impure blood abounding with Sulphur diſſolved with Salts, if perhaps while it is rarified within the Lungs, and looſned in its frame, it meets with an acid humor, it will exhale in breathing putrid and horrid effluvia's. It happens by the like reaſon of the blood otherwiſe diſpoſed, that as the breath of ſome perſons is very ſtinking, ſo of others very ſweet. And indeed the breath or air reciprocated through Reſpiration, for that it carries out with it the effluvia's of blood highly rarified within the *Præcordia*, one while diſperſes a grateful vapor, another while a moſt unpleaſant.

SECT. I. CHAP. VIII.

Of a Peripneumony, or Inflammation of the Lungs.

The deſcription of a Peripneumony.

A Peripneumony is uſually defined to be, An Inflammation of the Lungs with an acute Feaver, a Cough, and difficult breathing. They who labour with this diſtemper are greatly ſenſible of a notable inflammation in their breaſt with a ſwelling of the Lungs, and ſometimes a pricking pain, they draw a painful and ſhort breath, or as *Hippocrates* affirm, a deep breath; the Feaver preſſes with great thirſt, watching, and painful Cough; whereto alſo bloody ſpittle, or ſtreakt with blood, ſucceeds. By which Symptoms it clearly appears, that this diſeaſe ariſes, in as much as the blood boiling feaveriſhly, doth not eaſily paſs through the leſſer pneumonic Veſſels; but ſticking, in their paſſages, begets firſt an obſtruction, afterwards being more heaped and extravaſated, propagates a Phlegmon or Inflammation with heat, a Cough, and diſcoloured ſpittle. Moreover in as much as the blood ſo accumulated and ſtagnating, puffs up theſe paſſages of the Lungs, and compreſſes them, a difficulty of breathing is cauſed; and in as much as it pulls or diſtends the nervous Fibres, a pain frequently ariſes.

After what manner a Phlegmon is bred in the Lungs.

But if it be asked, how a Phlegmon ſhould grow together in the frame of a Lung meerly bladdery and excarnous; and after what manner it is diſtinguiſhed from that diſtemper which is wont to be ſtirred up in muſculous fleſh, or the ſubſtance of a bowel? We muſt anſwer, although the above-mentioned parts vary as to the texture, notwithſtanding the reaſon of the affect is altogether the ſame in each of them. For the ſmall ſanguiferous veſſels do every where alike embrace, bind, and variouſly gird about both all the Tracheal paſſages in the Lungs, and alſo the fleſhy fibres in the Muſcles, and laſtly the little fibres and nervous threds, with the thickeſt foldings, like cluſters, of the Parenchyma. But that which produces a Phlegmon is the blood it ſelf, which, while it grows very hot, and is hindred in its paſſage, every where, and eſpecially in the Lungs, whoſe veſſels branch into very ſmall foldings, doth firſt beget an obſtruction, and then an inflammation.

The conjunct cauſe of a Peripneumony conſiſts in two things.
1. That the blood boils.
2. That it ſticks in the paſſages.
Sometimes this diſpoſition ſometimes that is firſt.

Wherefore the formal reaſon and conjunct cauſe of a Peripneumony conſiſts in theſe two things *viz.* that the blood boils feaveriſhly, and ſticking alſo within the more narrow paſſages of the Lungs, engenders there an obſtruction cauſing inflammation. Unleſs theſe two things concur, there is an exemption from this diſeaſe; for in many other Feavers, eſpecially in a burning Ague, though the blood, moſt intenſly, heated and inflaming all the *Præcordia*, as alſo in the longing of women, the Green-ſickneſs and the Dropſie of the breaſt, is very clammy, yet though ſticking very much in the paſſages of the Lungs, it does not ſtir up a Peripneumony: to produce which both diſtempers muſt concur and joyn their ſtrength. Nevertheleſs when there is an indiſpoſition of both theſe, one while this, another while that, is firſt in act, and after a ſort one is the cauſe, or at leaſt the occaſion of the other. For ſometimes the blood irritated into a Feaver cauſes an obſtruction of the Lungs; and the blood alſo ſometimes finding a remora in the Lungs, receives a feaveriſh boiling from its proper obſtruction. Not-with-

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withstanding, for the constituting the procatarctic cause of this disease, the blood ought to be fitted as well for the boiling, as for the obstructing the vessels of the Lungs.

What that is Phlebotomy discovers.

Tho it will not be easie to shew what this disposition of the bloody liquor is inclining to a Peripneumony, yet the reason thereof doth something appear by Phlebotomy, always made use of in this disease with the best success. For the blood being drawn from any labouring with this disease, as also from those in a Pleurisie, after it grows cold in its superficies, instead of a Scarlet cream, it hath a little film somewhat white or otherwise discoloured growing on it, which also is very tough and viscous: whence we may conjecture, that the mass of blood being too strait in its frame, whilst that in the circulation it doth not discharge its recrements, grows too thick, and as it were clammy, and for that cause becomes too prone as well to boil as to stick within the narrow passages, and especially of the Lungs.

What affection of the blood produces it.

But if farther inquisition be made, from whence this disposition of blood proceeds, by which it becomes clammy and viscous like ropy wine; the general reason hereof is this, *viz.* that the more thick parts of blood are not made thin enough by the more subtile; so that all of them being equally mixed and mutually incorporated, at length the good humors separate themselves into their appropriate functions, and the superfluous are perpetually discharged by their proper Emunctories. But on the other side in as much as the sulphureous particles of the blood being combined together with the saline and earthly too much exalted, ensnare and entangle all the rest; for that cause its liquor containing within it self all its recrements and impurities, grows clammy as glue, and in that regard contracts an inflammable disposition.

For it is obvious to every person, that the blood that grows clammy in this manner, is rendred prone to obstruct the narrow passages of the vessels (which surely are very small in the Lungs); moreover for the same reason they are disposed to become feverish: *viz.* because retaining obstinately within its own bosom all the feculencies and recrements, from the same presently gathered into a heap, it is constrained into a great turgescence or swelling, whereby of necessity an inflaming obstruction of the Lungs takes either its origine or augmentation.

The fault of the Lungs produces it.

Moreover as to the procatarctic cause of this disease very frequently the faultiness of the Lungs is joined herewith, and determines that general intemperament of blood to affect this part in such a sort. For as the clammy blood grows hot, the more strong and sound *Præcordia* do frequently discharge the designed mischief from themselves, and the taint being fixed to the Pleura, or about the habit of the body, a Pleurisie or Rheumatism is rather caused than a Peripneumony. Nevertheless the tender Lungs being obnoxious to a Cough, or formerly prejudiced in their frame either by spitting blood, or other distempers of the breast, from the blood boiling up (while it is too much bound and clammy in its own consistence) they easily engender an obstructing Phlegmon.

The evident causes of a Peripneumony.

Hitherto of the conjunct and procatarctic causes of a Peripneumony: as for what regards the evident causes, whatsoever suddenly perverts the temperament of the blood, or restrains its free transpiration, ought to be referred hither, as chiefly are excesses of heat and cold, or the inordinate drinking of Wine or strong Waters, any vehement exercise, and the drinking of some waters, and those especially icy. Besides, sometimes a malignant distemperature of Air doth engender this disease in many, and makes it Epidemical.

It often succeeds or follows after a Pleurisie.

Authors in Physick do every where observe (and it is also a vulgar observation) a Peripneumony frequently succeeds or comes upon a Pleurisie; but nothing is more usual than in a Pleurisie a bloody and thick-spittle, and as it were purulent to be voided. Hence a great disquisition arises, by what passage or ways the matter by spittle cast out, can be conveyed from the Pleura to the Tracheal passages. Some think, that this being fallen into the cavity of the *Thorax*, is sucked into the Lungs as with a Sponge; and others suppose, that it is transferred thither by the Membranes adhering thereto, by which the Lungs often stick unto the Pleura. But truly either way seems improbable if not impossible. For first, that the Lungs do not suck in the contents of the hollowness of the Chest is manifest from hence, because in a Dropsie or wound of the breast, when they happen, the Lungs being unhurt, neither water nor blood is at all discharged by coughing; though frequently great plenty of this or that humor be there, which presently flows out of its own accord from the *Thorax*, incision being made. But that sometimes the Membranes growing from the Lungs, knit themselves to the Pleura, is clearly manifest by Anatomical Observation; yea and by this way of return I have sometimes known the purulent matter translated into the side, and there by an Issue, made by Art or Nature, to have been evacuated with a healthful Crisis: nevertheless such Membranes of the Lungs joined to the Pleura do seldom pre-exist, and in a Pleurisie, which is a very acute disease, they cannot, like a Mushroom, be the issue of one or

two

two days: moreover, though ſometimes thoſe obſcure paſſages may be ready at hand, which perhaps by ſome admirable inſtinct of Nature diſcharge ſomething out of the Lungs towards the precincts of the *Thorax*; yet it ſeems againſt the Oeconomy of Nature, that they can derive any corruption outwardly engendered to this moſt noble part within, which ſurely is the fountain both of life and heat.

The reaſon of this is inquired into.

As to this, if it may be lawful to propound our Judgment, I am induced to think that a Peripneumony and Pleuriſie are one while ſingular and ſeparate affects, and another while bred together and coexiſting from the firſt, and another while are by courſe one after another or ſuccedaneous. For the procuring cauſe being ſtirred up into act, ſo that the blood growing clammy, and boiling together, obſtructs in ſome places the leſſer veſſels: the neſt of the diſeaſe ſometimes is faſtned on the Pleura, or ſeperately in the Lungs, ſometimes in each of them together, and ſometimes firſt in one, and then in t'other: but for the moſt part, the Pleura being firſt healed, preſently the ſame morbific cauſe invades alſo the Pneumonic Veſſels. Moreover we have known a various ſhifting of this effect; *viz.* that it has firſt troubled the right or left ſide, preſently that being deſerted, to have occupied the Lungs, and afterwards both being deſerted, to affect the Brain, and frequently to transfer its ſeat from thence into the above-mentioned places. But for the reaſon aforeſaid a Peripneumony not only ſucceeds a Pleuriſie, but frequently a Squinancy, and ſometimes other diſtempers: for while the Blood growing clammy, and boiling together, continues a Feaver in the whole, it transfers the obſtruction cauſing a Phlegmon variouſly hither and thither. And from hence the ſolution of that obſervation is clearly manifeſt, which has ſo much puzled Interpreters, *viz.* that a Palſie or dead Palſie of one ſide doth ſometimes ſucceed a Peripneumony, becauſe the blood that being clammy, had lately obſtructed the Pneumonic Veſſels, afterwards ſtuffing certain foldings of the veſſels of the Carotides, prohibits the engendring of animal ſpirits in this or that part of the head, and ſo reſtrains their influence into the reſpective nervous parts. From what hath been ſaid, the chief differences of a Peripneumony are made plain, namely that it is either a ſimple diſtemper, or joined together with a Pleuriſie, Squinancy, or ſome other, and then it is either primary or ſecondary. Moreover it is uſually diſtinguiſhed as to the Feaver and ſtate of breathing: to wit, according as this is more or leſs prejudiced, and as it ſhall be more intenſe or remiſs, this diſeaſe alſo is denominated either more or leſs acute.

The differences of this diſeaſe.

Prognoſtics.

As to the Prognoſtics of this diſeaſe, common experience doth atteſt, that it is a very dangerous diſeaſe, becauſe many Patients either die of it, or very difficultly recover health. No leſs may we conclude this from the reaſon or Etymology of it; for a wound with much extravaſation of blood, or a ſtagnation cauſed in the Lungs, is moſt difficulty cured, and the affected place is never reſtored unto its former conformation. The Prognoſtic ſigns, which are of greateſt note, are taken from the appearance of Symptoms and nature of things thrown out, and the State of ſtrength.

1. From the appearance of Symptoms.

1. A Peripneumony coming upon a Pleuriſie or Quinzy, for the moſt part is worſe than ariſing of it ſelf, or ſucceeding either of them: but if upon this diſeaſe, after what manner ſoever begun, an acute Feaver follows with great thirſt, watchings, and not breathing unleſs ſet upright, it is ill; and yet much worſe, if upon it a Delirium, a Frenzy, convulſive motions, or a Palſie on one ſide enſue. Moreover the Patient is not in leſs danger, if he be very purſie, if troubled with vomiting, or frequent ſwounding away, a weak Pulſe, and a cold ſweat. For while theſe Symptoms are inſtant upon him, the obſtruction of the blood in the Lungs is not removed, nothing is digeſted or ejected by ſpittle; but circulation of the blood being more and more hindred, and its kindling by breathing ſtopt, the animal ſpirits are throughly diſordered, and at length faint, until together with a proſtration of the whole ſtrength the vital flame is extinguiſhed.

2. From what is excreted.

2. As to Prognoſtics from things excerned, we obſerve Peripneumony to be dangerous, wherein nothing is thrown out by ſpittle; next to this, when the ſpittle is thin and crude, mixed with blood; it is far better when the ſpitting is yellow and thick, ſtreaked with a little blood. The Urine being yellow from the beginning, and of a good conſiſtency, with a cloud in the midſt ſhews that almoſt all the recrements of the blood are lodged in the place affected; when from that ſtate it is changed into a thick and turbid Urine, it ſhews the morbific matter to be ſwallowed up again from that part into the blood; but if ſuch kind of Urine be ſuddenly changed into a thin one, then a Delirium or death it ſelf is impendent. Much Sweat and plenty of Urine, a Diarrhœa, bleeding at Noſe, flowing of the Menſtrua's, or the Hæmorrhoids do frequently promiſe good in this diſtemper, yea any of theſe Evacuations happening ſeaſonably doth frequently diſcharge the diſeaſe.

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3. From the ſtate of ſtrength.

3. The condition of ſtrength is ever of great moment in forming a due Prognoſtic in this diſeaſe: for oftentimes when horrid Symptoms, as an intenſe Feaver, a Breathing very painful, with a Cough, watchings, and other ominous ſigns, ſhall be preſſing, if the Pulſe be as yet ſtrong, and the animal ſpirits perſiſt in their vigor, there is better hope of the Patient, than if theſe things being more quiet, there were a week Pulſe, and the Spirits ſhould become drowſie and oppreſſed.

The Cure hath two chief indications.

The firſt indication about the curatory Method in a Peripneumony is, that the blood being impacted in the pneumonic Veſſels, and cauſing a Phlegmonous obſtruction, may be from thence diſcuſſed and reſtored to its priſtine circulation. Which if not to be procured, the ſecond indication will be, that that matter be dully digeſted or brought to ſuppuration, and with all expedition voided by ſpittle.

The firſt indication ſuggeſts four intentions of curing.

While the former indication prevails, the intentions of healing will be theſe enſuing. Firſt, that the more plentiful afflux of blood to the part affected be prevented, or prohibited, by ſome means. Secondly, we muſt indeavour, that the matter ſtagnated or extravaſated in the Lungs, be ſwallowed again by the Veins into the reſt of the maſs, and cauſed to circulate. Which that it may be the better procured, thirdly, the blood ought to be freed from its clammy viſcouſneſs, whereby its fluidity is impeded. Fourthly, that we apply to the Symptoms moſt urgent, *viz.* a Feaver, Cough, Watchings, and difficult Breathing, fit Remedies. But if notwithſtanding all theſe another indication ſhall come into uſe, it will be requiſite to preſcribe maturating and expectorating Medecines vulgarly ſo called, together with theſe.

1. The firſt intention that the afflux of blood may be cut off. 2. That the extravaſated be reduced to circulation.

1. That we may ſatisfie the firſt and ſecond intention together, Phlebotomy is for the moſt part requiſite in every Peripneumony, yea ſometimes it ought to be more frequently repeated; for the veſſels being emptied of blood do not only withdraw the nouriſhment of the diſeaſe, but do alſo ſup up the matter impacted in the place affected. Wherefore if ſtrength remain, and the Pulſe be ſtrong enough, a more free breathing of a Vein is convenient at the very beginning; but otherwiſe let it be uſed in a little quantity, which however may be repeated as occaſion offers it ſelf. We intimated above, that blood drawn in a Peripneumony and alſo in a Pleuriſie, after it is cold, contains in its ſuperfices a ſmall viſcous and diſcoloured film: moreover we may obſerve one while the blood entirely, another while only a portion thereof is ſubject to this change. For when the blood is received into three or four diſhes, ſometimes in all, but oftener in the ſecond and third diſh it is apparently bad, and in the firſt and laſt laudable enough: wherefore they commonly give it in precept, that blood is alwayes ſo long to be emitted, till that which is ſo depraved begins to come forth; and if ſtrength remain, the bleeding ſhould continue till the good blood flows out again. Truly as common experience doth approve of this praictice, even ſo doth reaſon it ſelf; for in this diſeaſe, becauſe the whole maſs of blood doth not preſently acquire that clammineſs, the depraved portions are chiefly accumulated about the place of obſtruction, and adhere on every ſide in the leſſer veſſels. Wherefore the blood firſt iſſuing by Phlebotomy is often void of any fault; afterwards the veſſels being emptied receive the other morbific matter at firſt ſtagnated, and reſtored it to its circulation; and when the portions thereof being placed near, are carried as it were in a joint troop, they flow out together at the orifice of the opened Vein, and after that entire maſs of bad blood hath flowed out, the reſidue being more pure doth ſucceed. Wherefore in this caſe ever let inciſion be made with a large orifice, and let the blood be drawn out not only with a more plentyful ſpouting, but alſo with a continued: for otherwiſe if in the midſt of Phlebotomy, the bad blood iſſuing out, the orifice (as the manner of ſome is, leſt the ſpirits ſhould faint) be cloſed with the finger, when again it is opened, the blood pure enough will iſſue next, but the bad ſliding by, if there be any remaining, will not return preſently to that orifice. Beſides Phlebotomy many other remedies, *viz.* whatſoever do repreſs the turgency of Blood, and empty the paſſages thereof, whereby the morbific matter may be ſuckt up, are here to be uſed. Wherefore a very thin diet is preſcribed for the moſt part meerly of Barley and Oats: and if Cathartics are altogether prohibited, becauſe they diſquiet the Blood, and hurry it more impetuouſly into the part affected; notwithſtanding Clyſters which gently looſen the Belly, and draw the recrements of the blood towards the Belly, ought to be daily uſed. Moreover Juleps and temperating Apozems which bridle the fervour of the blood, and draw out the ſuperfluous ſeroſities thereof, and which alſo do gently open the paſſages of the Breaſt, are taken with ſucceſs

Rules concerning Phlebotomy.

The third intention of healing is that the clammineſs or viſcoſity of the blood may be taken away.

3. The third intenſion of healing, which reſpects the withdrawing of the clammineſs or obſtructing viſcoſity of the blood, is altogether to be performed by remedies which unlooſe the frame thereof being too much bound, and diſſolve the coupling together of its ſalts. And truly the remedies of this kind, which in this reſpect reaſon and

analogy

analogy would dictate, are now received into use by long experience. For Powders of Shell-fish, the Tooth of a Boar, and the Jaws of a Pike, and other things endued with an Alkali Salt, also Sal Prunellæ, for the most part are prescribed by all Practitioners, as well modern as ancient. I have more frequently known the Spirit of Salt Armoniac and of Harts-horn to have yielded notable relief in this disease: and for the same reason it is, (*viz.* because the volatile Salt is useful) that the infusion of Horse-dung, though a common remedy, affords oftentimes singular help.

4. That the most urging Symptoms may be helpt.

4. As to the Symptoms and their Cure, very many remedies appropriated to these fall in together with the former; for against the Feaver the same Julips and Apozems which appease the heat of blood, and withal recreate the animal spirits are of most common use: to which besides in respect of the Cough and difficult breathing, temperate pectoral Remedies are added. The great difficulty is what ought to be exhibited against want of sleep, when it shall grievously oppress; for Opiates, because they do further prejudice the breathing, which in this disease is already hindred, are scarce safely administred, nay sometimes become mortal. Wherefore Laudanum and the strong Preparations of Opium are to be shun'd in a Peripneumony worse than a Dog or a Snake; nevertheless Anodynes sometimes, and mild Hypnotics, as water and Syrup of red Poppies, are not only allowed, but accounted specific remedies in this disease and in a Pleurisy: but sometimes it will be expedient to use Diacodiates as long as strength endures, and as long as the Pulse is strong and good enough. For the pain of the breast if at any time it be troublesome, it is expedient sometimes to apply Liniments, Fomentations, and Cataplasms.

The second indication respects the maturation and expectoration of the morbific matter.

The second curative indication whose intentions are to digest the matter impacted in the Lungs (if it cannot be discussed or suckt up) and to throw it out by spittle, requires ordinary maturating and expectorating Medicines, both which notwithstanding ought to be temperate, that is to say, such as asswage thirst, and appease the feaverish heat rather than exasperate it. We have above recited in the Chapter of a Cough the kinds of these sorts of Remedies properly called Pectorals; the more select Receipts and chiefly accommodated to this affect, shall be annexed here beneath.

The Forms of Remedies.

1, 2. The Medicines conducing to the first and second intention are prescribed according to the following Forms,

Juleps.

Take the water of Carduus Mariæ ten ounces, red Poppies three ounces, Syrup of the same an ounce, Pearls prepared a dram, make a Julep: the dose six spoonfuls every fourth hour.

Take water of black Cherries, Carduus Benedictus, Balm, each four ounces; powder of a Boars tooth a dram, Syrup of Violets ten drams: make it into a Julep to be taken after the same manner.

Apozemes.

Take Grass-roots three ounces, shavings of Ivory and Harts-horn each three drams, Raisins stoned an ounce and half, Liquorish two drams, boil them in Spring-water from three pints to two, to the strained liquor add Syrup of Violets an ounce, Sal prunellæ a dram: make an Apozem to be taken thrice a day about three or four ounces.

Purgation.

For the same intention, *viz.* that the Vessels being emptied may withdraw the nourishment from the disease, or sup up the morbific matter, a Purge is prescribed by many. In the Practice of the Ancients against this disease, even as against many others, after Phlebotomy, Preparatives and Purgatives were usually appointed in a constant course, and of late the Chymists with greater boldness do recommend Vomits, and in a Peripneumony prefer it to all other remedies. Yea Phlebotomy being omitted or countermanded, they place the chief Cure in stibiate Vomits: than which rash advice of theirs I know not any thing may be thought of more pernicious. Indeed in rustic and robust bodies sometimes this Cure has been effected without danger, notwithstanding for the most part no less unsuccessful; but in tender constitutions it ought to be reckoned little inferior to poyson. But for what respects Purgation, although it may not be presently convenient from the beginning, because it is then for the most part prejudicial, nevertheless the flowing of the morbific matter being finished, and the effervescency of blood being appeased, we may safely and gently evacuate the body with a loosning Purge.

Purges.

Take of the decoction of Senna of Gereon *four ounces, syrup of Roses solutive an ounce: mix them for a Potion.* Or,

Take the best Senna three drams, Cassia and Tamarinds each half an ounce, Coriander-seed two drams: boil them in a sufficient quantity of Spring-water to six ounces, to which strained add syrup of Violets an ounce, clarified with the white of an Egg, and let it be given.

Purgative

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Purgatives are not always to be exhibited, nor ever unadvisedly in this disease: but frequent Clysters, and almost daily are in use; but let them be gentle and emollient only, which easily loosen the belly, without any great agitation of humours or blood. For this purpose Milk or the Whey thereof is often convenient, with red Sugar, or syrup of Violets: Or,

Clysters. *Take the leaves of either sort of Mallowes, of Melilote, of Mercury, of each one handful, Linseed and sweet Fennel-seeds, of each half an ounce, sweet Prunes, numb.* vi. *boyl them in a sufficient quantity of Spring-water to a pinte, to which add syrup of Violets one ounce, Sugar ten drams, sal Prunella one dram, make a Clyster.*

Things dissolving the clamminess of the blood. 3. Medicines for the third intention, *viz.* for the dissolving the Clamminess of the Blood, are wont to be administred in form of a Powder, of a Spirit, a Potion, or of a Bolus, according to the manner following.

1. Powders.

Powders. *Take of Crabs eyes two drams, sal Prunella one dram and half, pearl'd Sugar one dram, make a powder for 6 doses, one to be taken every sixth hour, with a proper Julep or Apozeme.* Or,

Take of the Tusk of a Boar, (or the Jaw of a Pike) of Crabs-eyes, of each one dram and half, flowers of Salt Armoniack, Powder of red Poppy Flowers, of each half a dram, mix them for 4 doses.

2. Spirits and Chymical Liquors.

Spirits. *Take of spirit of salt Armoniack distill'd with Olibanum, 3 drams; the dose from 12 drops to 15 or 20, three times in a day.* Or,

Take Spirit of Urine or Soote, after the same manner, three drams.

Take of the sweet Spirit of Nitre, (viz. often cohobated with Spirit of Wine,) 3 drams, the dose from 6 drops to ten after the same manner.

Take half an ounce of Spirit of Tartar, dose 15 drops to 20 or 25, in a fit vehicle.

Take of the simple mixture one ounce: the dose is one scruple to half a dram, after the same manner.

3. Potions.

Potions. *Take of Cardnus-water one pound, fresh Horse-dung 3 ounces, dissolve it warm, and filtre it; the dose is 3 or 4 ounces, twice or thrice in a day, with half an ounce of Syrup of Violets or red Poppyes.*

Take of the Leaves of Dandelyon two handfuls, bruised and infused in half a pound of Carduus Mariæ water, Treacle-water half an ounce, press it out, and add powder of Crabs-eyes one dram: take 4 or 6 spoonfuls three times a day.

The cure of the Symptomes. The fourth intention of Healing in respect of the symptomes greatly urging, doth suggest divers sorts of preparations of Medicines. 1. In respect of the Feaver, the Juleps and Apozemes above recited are convenient. Moreover, the use of Mineral Crystal ought to be frequent. 2. For the Cough and difficult Breathings, Linctus's, Eclegma's, and Decoctions, or pectoral Juleps are administred with success.

Linctus's. *Take of Syrup of Jujubes, of Maiden-hair, of each one ounce and half, of Violets one ounce, flower of Nitre one scruple; make a Linctus to be lickt now and then.*

Take of syrup of Marsh-mallows one ounce, Diacodium, red Poppyes, each half an ounce, powder of Crabs-eyes two scruples; make a Lohoch, to be taken the same way.

Lohochs. *Take syrup of Hyssop, of Liquorish, of each one ounce and half, red Poppy-flowers powder'd, one scruple, Crabs-eyes one dram, Lohoch de Pino 6 drams, make a Lohoch, take the quantity of a Nutmeg four times or oftner in a day.*

An Apozeme. *Take the roots of Grass, Chervil, Marsh-mallows, of each one ounce, Figgs numb. 4. Jujubes and Sebestens, of each numb. 6, Raisins one ounce, Liquorish three drams, Barly half an ounce, boyl them in three pints of Spring-water to two, strain it; the Dose three or four ounces.*

Take Raisins stoned one ounce and half, Filberds numb. 4. cut, Liquorish sliced 3 drams, of Hyssop-water a pound and half, infuse them warm in a closed Vessel 6 hours, strain, and add syrup of Marsh-mallows an ounce and half, make a Julep, the dose is 3 or 4 spoonfuls often in a day, swallowing it by degrees.

3. Against

3ly, Againſt Watchings, *Take Poppy-water 3 ounces, ſyrup of red Poppies 6 drams, Aq. Epidemica 2 drams, for a draught, to be taken at night.* PHAR. Part. II.

If the Pulſe be ſtrong, and the ſtrength agreeable, *Take Cowſlip-water 3 ounces, ſyrup de Meconio half an ounce, for a draught at night.* *Againſt Watching.*

4. If the pain be troubleſome about the place affected, *Take Oyntment of Marſh-mallows two ounces, Oyl of ſweet Almonds an ounce and half, mingle them for a Liniment to be applyed with thin Lawn-paper.* *For pain.*

Take of Oyntment of Marſh-mallows and pectoral Oyntment, of each an ounce and half, Linſeed Oyl freſh drawn one dram, to which add the Plaiſter call'd Emp. de Mucilaginibus, make a Plaiſter for the Region of the breaſt, to be applyed on the place affected.

Fifthly, For the laſt intention of curing which anſwers to the ſecondary Indication, and preſcribes Medicines ripening and expectorating, the following forms are convenient.

Take Linſeed Oyl freſh drawn three ounces, Syrup of Violets two ounces, Hyſſop-water half a pound, mix them in a Glaſs, take two or three ounces three times in a day, ſhaking the Glaſs firſt. *Maturating medicines.*

Take powder of Olibanum one dram, put it into an Apple made hollow, and roaſt it in hot Embers, let him eat it at night, repeating it three or four times.

Take Oyl of Almonds freſh drawn, Syrup of Maiden-hair, of each an ounce and half, Sugar-Candy two drams, ſtir them well in a Glaſs-mortar until they are perfectly mixt, make a Linctus to be taken often in a day with a Liquoriſh ſtick; alſo let a ſpoonful be taken three times a day in a draught of Poſſet-drink. *Expectorating Medicines.*

As to the reſt, Remedies preſcribed againſt a beginning Conſumption do alſo profit in this caſe.

It would be eaſie to heap up here many Hiſtories and Inſtances of Patients affected with a Peripneumonie; but whereas the ſame order and figure of the diſeaſe, and the ſame reaſons of the Symptoms are almoſt in all, it ſuffices here to note one or two Examples only. And while I was writing theſe things I am ſent for to a Patient grievouſly ſick with a Peripneumonie. He was aged about Fifty years, lean in body, and of a cholerick temper, by taking cold he fell into a Feaver, with a Cough, with pain of the Breaſt, and difficult breathing: when he had laboured thus four dayes without any remedy or phyſical adminiſtration, I found him in a notable Feaver, with thirſt, and a huge inflammation of the Precordia, breathing very difficultly, with labour of the Thorax, and painfully, with a noiſe of the Bronchia, inſomuch that he ſeemed evidently in the very Agony of death. His Pulſe being ſtrong enough (although quick and diſturbed) I immediately preſcribed Phlebotomy, to eight or ten ounces, by which when he received a little relief, after three hours intermiſſion, a Clyſter being firſt adminiſtred, I ordered him to repeat his bleeding to twelve ounces: Moreover, I ordered Spirit of Harts-horn to be given twelve drops every ſixth hour, with an appropriate Julep, and in the diſtance between I ordered a doſe of the following Powder to be adminiſtred: *The firſt Hiſtory.*

Take powder of Crabs-eyes, ſal Prunella, of each one dram and half, Pearls a dram, Sugar-Candy two ſcruples; make a powder to be divided into 8 doſes.

Moreover, he took as often as he pleaſed a draught of a pectoral Apozeme. By the uſe of theſe within three hours all the ſymptoms began to abate, and the night following he ſweat, and ſlept a little; the day after I repeated Phlebotomy, and after continuing the ſame Remedies in four or five days he intirely recovered his health. The blood we took from him was always in the Superficies viſcous and diſcoloured.

A certain Gentleman of a ſanguine Complexion and a ſtrong habit of body, after an immoderate drinking of Wine contracted a Feaver, with a moſt painful Peripneumonie, inſomuch that thirſt and heat mightily preſſing him, ſitting always upright in his Bed or Chair, and breathing ſhort and very frequent, he could ſcarcely, yea almoſt not at all ſuck in air enough to ſuſtain the vital flame. Becauſe he could not undergoe a large Phlebotomy, I drew blood twice or thrice day after day; frequent Clyſters were adminiſtred: Moreover, Apozems, Juleps, alſo Spirit of Armoniack, and powder of *The ſecond Hiſtory.*

Fiſh-ſhels

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Fiſh-ſhells were adminiſtred by turns. Within four or five days the Feaver ſomewhat abated, alſo he began to breathe better, and ſometimes to take ſhort ſleeps, yet he did always complain of a notable heavineſs of his breaſt, and intolerable oppreſſion of the Lungs; wherefore, when Phlebotomy was no longer ſafe, I applyed very large Veſicatories to his Arms and Thighs, the bliſters in his arms dry'd up in a ſhort ſpace, but thoſe on his legs did not only remain open, but after five or ſix days did run hugely, and afterwards almoſt for a month daily diſcharged great plenty of a moſt ſharp Ichor; in the mean time his lungs ſenſibly amended, and at length were delivered from all their burden; laſtly, the little ſores raiſed by the Veſicatories very painfully and not without frequent Medicines could be cured.

SECT. I. CHAP. IX.

Of a Pleuriſie.

The diſeaſes of a Pleuriſie and Peripneumonie are akin.

HOw great affinity there is between a Pleuriſie and Peripneumonie, we have hinted before; *viz.* although either diſtemper is ſometimes ſolitary, and exiſts ſeparately from the other, yet they often happen together, or one while this, another while that, come one upon the other, or ſucceeds it. The foregoing cauſe is the ſame of both, *viz.* a diſpoſition of the blood to be clammy and boyl up withall; alſo, the conjunct cauſe is the ſame, *viz.* an obſtructing Phlegmon in ſome part of the leſſer Veſſels, by reaſon of ſuch a diſpoſition of blood. Moreover, the ſame method of Cure is preſcribed by moſt modern Phyſicians for either diſeaſe: The chief reaſon of the difference whereby they are diſtinguiſhed one from the other, is taken from the places affected, which their Names denote. For the blood prediſpoſed to the enkindling in ſome place an inflaming obſtruction, therefore often plants the neſt of the diſeaſe in the breaſt, becauſe here it burns out more hideouſly, by reaſon of the Hearth of vital fire; and alſo is not freed from the vaporous Effluviums and other Recrements which hinder Circulation. To all which there enſues, that in this Region, the maſs of blood being ſhut up, and not able to paſs through the more ſtrait Conveyances; is not as in the bowels of the lower Belly, opened with any ferment, or new waſht with any watery juice: wherefore, if perhaps the blood, carried through the vertebral Arteries into the membrane encompaſſing the ribs, ſhall ſtick in its paſſage, about the narrowneſs of the Veſſels or inter-ſpaces, the Diſtemper of which we now treat ſucceeds: In like manner, if an obſtruction happen within the paſſages of the Lungs, a Peripneumonie, will enſue, as we have declared before. Wherefore, according to the Pathologie of this diſeaſe before delivered, thoſe things which belong to the Theory of a Pleuriſie, as well as the Curatory method, may with ſmall labour be deſigned.

How they differ betwixt themſelves.

The ſeat of a Pleuriſie.

Both the ſenſe of pain, as well as Anatomical Obſervations taken from the Patients dead of a Pleuriſie do plainly atteſt, the ſeat of this Diſeaſe (as often as it exiſts primarily and ſolitarily) conſiſts in the Pleura or Membrane environing the inſide of the ribs. And a true and ſingular Pleuriſie is an inflammation of the Pleura it ſelf, from the abundant flowing in of inflamed blood, growing clammy withall, taking its motion through the vertebral Arteries, with a continual and acute Feaver, a pricking pain of the ſide, a Cough and difficulty of breathing.

The next cauſe of it.

The next Cauſe is the blood obſtructed by reaſon of its clammineſs in the leſſer veſſels and interſpaces of that membrane (in like manner as it is in a Peripneumonie) or being extravaſated, being heaped in the ſame place more plentifully, by reaſon of the ſwelling up, for that cauſe exciting an inflammation. An acute pain ariſeth upon this, by a wound in a part highly ſenſible; alſo there ariſeth a Cough by reaſon of a provocation giving impreſſion to the intercoſtal muſcles; moreover a difficult breathing by reaſon of the muſcular fibres being hurt as to their action; which becauſe they cannot perform long and ſtrong contractions, they are conſtrained to undergo weak although more frequent Contractions, otherwiſe than in a Peripneumonie, in which that ſymptom ariſeth from a Lung too much fill'd and ſtuffed. The Feaver is caus'd from efferveſcence of blood, and is for the moſt part rather the aſſociate than the effect of a Pleuriſie. For the blood from what cauſe ſoever driven into a feaveriſh turgeſcency, if it be bound up together in its maſs, will be apt to grow clammy, which together with the Feaver moſt often induces a Pleuriſie or a Peripneumonie, or both of

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of them. From hence we may obſerve this diſeaſe doth frequently vary its kind, and change its place, *viz.* from a Pleuriſie into a Peripneumonie, and on the contrary; afterwards it paſſes from both or either into a Frenzy or a Squinancy: for that the blood while it is boyling throws off its viſcous recrements one while in this part, another while in that, another while in more together, and laſtly it reaſſumes them again, and variouſly transferrs them.

The more remote cauſes of this Diſeaſe.

The more remote cauſes of a Pleuriſie are the ſame as of a Peripneumonie, *viz.* whatſoever ſtirs up the blood, prediſpoſed to grow clammy and alſo to boyl up, and provokes a feaveriſh turgeſcency. Hither appertains exceſs of heat and cold, a ſudden conſtipation of the pores, ſurfeit, drinking of Wines or Strong-waters, immoderate exerciſe; ſometimes the malignant conſtitution of the Air brings this diſeaſe almoſt on every body, and renders it Epidemical: whereto may be added, that this diſeaſe is very familiar to ſome from their conſtitution or cuſtome; ſo that a diſtemperature of blood, induced almoſt by any occaſion, immediately paſſes into a Pleuriſie.

From what we have already ſaid, the ſigns of this diſeaſe do appear manifeſt enough, by which it is well known as to its Eſſence, and is diſtinguiſhed from other diſeaſes, and eſpecially from a Baſtard Pleuriſie and a Peripneumonie. But it is to be obſerved that a pain in the ſide ariſes ſometimes very troubleſome; which while it counterfeits a Pleuriſie, is ſometimes taken for it, although falſly. For in ſome perſons obnoxious to the Scurvy, and the affects of the nervous kind, ſometimes it happens that a ſharp humour, and very painful deſcends into the Pleura or intercoſtal Muſcles, and being fixt there produces moſt fierce tortures; which diſtemper is yet diſcriminated from the Pleuriſie, inaſmuch as it is void both of Feaver and Thirſt, the Pulſe always abides moderate and laudable, frequently the appetite and ſtrength endure; moreover, the pain is not long fixed or limited to one place, but ſenſibly creeps hither and thither into the neighbouring parts, as the matter ſlides down through the paſſages of the fibres, out of one place into another.

The differences of it.

We meet not with many differences of this diſeaſe; notwithſtanding it is uſed to be diſtinguiſhed, *viz.* to be either true and exquiſite even as we have now deſcribed, or ſpurious, which having its ſeat in the intercoſtal muſcles, or their interſpaces, proceeds from wind, or a ſerous and ſharp humour heaped up in the ſame place, and raiſes a pain leſs ſharp, without ſo much as an inflammation or feaver: And whereas the grief is planted externally, the Patient for the moſt part lyes better on the oppoſite ſide, otherwiſe than in a true Pleuriſie. Secondly, a Pleuriſie is either ſingle, or complicated with a Peripneumonie or ſome other diſtemper, and ſo it is either primary, or ſecondary, or join'd with ſome other affection.

The Prognoſticks.

As to the Prognoſtics of this diſeaſe, *Hippocrates* hath obſerved many certain tokens whereby a good or evil event is ſignified to Patients ſick of the Pleuriſie. To run through each of theſe, and to unfold them with Commentaries added to them, we have neither leiſure, nor doth it ſeem worth our endeavours. The chief thing of all in a Pleuriſie, is, that the diſeaſe be preſently diſpatch'd partly with a free and frequent bleeding, and partly by a Critical Sweet, ariſing about the fourth day, or before the eight; or theſe things not duely ſucceeding, it will be prolonged, and then moſt frequently a Peripneumonie or Empyema, or a Collection of corrupt matter between the Breaſt and Lungs, or both diſtempers do ariſe in this diſeaſe; from which there follows a ſolution of the diſeaſe but ſlow and incertain, and moſt frequently full of dangerous chances.

A Peripneumonie coming upon a Pleuriſie not preſently cured (as it is often wont to be) all our hope is placed in digeſting maturely the Spittle and quick Expectorating thereof: for if this be laudable and plentiful, and eaſily and haſtily thrown off, it doth often finiſh both diſeaſes intirely. Notwithſtanding, it is not therefore a conſequent that the matter of a Pleuriſie is derived from the ſide into the Lungs by I know not what blind paſſages, or that the ſame being ſweat out of the Pleura into the Cavity of the breaſt is imbibed by the Lungs, and at length drawn upwards through the paſſages, and excern'd forth. But when a Peripneumonie ariſes on a Pleuriſie, and the matter impacted in the Lungs begins to be evacuated by Spittle, ſo that the affected places of the Lungs are continually emptyed; the blood reſumes the other matter fixed in the Pleura, and carries it to the Lungs where the places or conveyance are open, to be ejected by Spitting. But if the Pleuriſie be cured neither by it ſelf, nor aſſociating with a Peripneumonie, then at length either by an Impoſthume made in the Pleura or in the Lungs, an Empyema or corruption between the Breaſt and Lungs ſucceeds; or all the matter being brought into the Lungs and there putrified, looſning the unity of the Viſcera, it propagates a mortal or ſcarce curable Conſumption.

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The Cure thereof.

As to the cure of the Pleuriſie, foraſmuch as the ſtate of this Diſeaſe, the Criſis and tendencies are manifold, divers curatory Indications offer themſelves according to their various regards; and as occaſion ſerves, according to the advice of a prudent Phyſician, they ought to be appointed in the beginning, and ſometimes altered or continued. For ſurely one Method is convenient for a ſolitary and ſimple Pleuriſie, and another if it be complicated with a Peripneumonie: Beſides it behoveth to ordain another and another if perhaps a Criſis be expected by Spitting, or matters growing worſe, the diſeaſe is either paſſing into an Empyema, or tends to a Conſumption. As to the three later caſes, that is to ſay, when a Pleuriſie commencing, paſſes into a Peripneumonie or Empyema, or laſtly into a Conſumptive diſpoſition, there is deſigned an appropriate way of curing in the Pathologies of each of theſe diſeaſes particularly delivered. But as to what appertains to our preſent purpoſe, three Indications offer themſelves for a primary and ſimple Pleuriſie, and they are curatory, preſervatory and vital.

The firſt Indication.

I. The firſt Indication takes care that the Inflammation or obſtruction of blood in the Lungs by all manner of means with all expedition be removed; for which intent Phlebotomie in every Age by all Phyſicians (excepting ſome Fanatick or falſe Chymiſts) is wont to be preſcribed, as a principal remedy: The reaſon of which is altogether the ſame as in a Peripneumonie and many other diſtempers, cauſed by reaſon of a ſtop of blood in ſome place, and ſo an accumulation: Becauſe that the veſſels bringing blood being much emptied, do not only reſcind the nouriſhment of the diſeaſe, but drink up the matter which is the conjunct cauſe thereof, and convey it to another place. Wherefore blood is to be freely drawn away in a Pleuriſie, if the ſtrength endure it, and the Pulſe be ſtrong. And ſurely it is far better that the firſt time and every time after (as often as there is need to repeat it) blood be more largely emitted, than to do it more often and more ſparingly. For very many portions of the blood growing clammy and degenerating into viſcouſneſs, are heaped up about the place affected; which, unleſs they are call'd away from thence by emptying the Veſſels through large Phlebotomie, and in a great part let forth, the letting of blood will be fruſtrated of its deſired effect. Wherefore, that Phyſicians preſcribe blood in a Pleuriſie to be drawn out even to ſwooning, ſeems not incongruous to reaſon, although that practice is not raſhly to be attempted, for that every evacuation ought to be proportioned to the tenour and tolerance of the ſtrength, which rule ſuch a Phlebotomy doth exceed.

Phlebotomy neceſſary almoſt in all Pleuriſies.

What Vein is to be opened in a Pleuriſie.

But though there is almoſt a general conſent of all Phyſicians to breath a vein in a Pleuriſie, notwithſtanding there was ever an earneſt contention about the place, what Vein ought to be opened. *Hippocrates* and *Galen* opened a Vein on the ſame ſide of the patient; afterwards the *Arabians* and their followers the *Italians*, and *French*, did either open the *Saphene* or the *Baſilica* of the oppoſite ſide, damning the Phlebotomy of the ſame ſide by Bell, Book and Candle. Yet in the later generation, the practice of the Ancient *Greeks* by little and little revived, ſo that ſome did dare to make inciſion on the ſame ſide; yet always one ſide judged the others of the oppoſite perſwaſion as it were guilty of murder, as often as any unlucky event did happen. So that while among Phyſicians about Phlebotomy there was no leſs a contention than among the *Jews* and *Samaritans* about the Sacred place of Worſhip, at length the Doctrine of the Circulation of the Blood held out like a new Light by the moſt renowned *Harvey*, diſcuſs'd all the clouds of this Controverſie; ſo that immediately it clearly appeared to be almoſt the ſame thing, whether inciſion be made in the Vein on the affected or oppoſite ſide of a Patient ſick of a Pleuriſie; although in our Age Cuſtom hath prevailed firſt and rather to open the Vein of the affected ſide. Notwithſtanding a Vein being opened in either Arm draws nothing at all immediately from the vertebral Artery or from the Pleura; they are only the branches of the Azygos, or of the vertrebral Vein that receive the blood out of the place affected: but that they may accompliſh this, they are not unloaded in any other manner, but that the quantity of the whole blood be abated by Phlebotomy whereſoever made. Onely this may be affirmed for opening rather the Vein of the affected ſide, that the Baſilick Vein being unloaded, the Arteries of the Arm receive the more ample proviſion of blood; from hence the bloody ſtream of the Vein Aorta runs down more ſwiftly from that ſide towards the branches of the Arm, and perhaps in the interim of its quick paſſage it infuſes leſs blood into the vertebral Arteries, for the nouriſhment of the diſeaſe. As to that opinion, that the blood is ſometimes more plentifully carried from place to place, that from hence the right Lung or Liver being beſet with an inflammation or obſtruction, the right part of the head is in pain, and of the face grows more red; I ſay this ſometimes is brought to paſs, becauſe the Patients

Various opinions are recited.

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do conſtantly lie in their bed on the ſide affected; wherefore, the Veſſels being compreſs'd, the blood ſtays longer in other parts of the ſame ſide while it is circulating. But of theſe things we will make a more diligent ſearch when we ſhall render the Hiſtory and Ætiologie of Phlebotomy.

Cupping-glaſſes with Scarification ſupply the place of blood-letting.

But if Phlebotomy by reaſon of a weak pulſe, and fainting of the animal function, neither ought to be at firſt adminiſtred, nor repeated, though the pain be moſt urging; Cupping-glaſſes with Scarification do well ſupply the turn hereof, being applied to the place pained. *Riverius* and *Zacutus Lucitanus* have cited notable Examples of Cures effected by this remedy. And ſurely this practice ſeems to lean upon a reaſon ſtrong enough; for the blood being drawn away from the ſide affected, that which is lodged in the neighbouring veſſels, being the conjunct cauſe of this diſeaſe, is moved with it, and partly drawn away, and partly turned it to its Circulation. Moreover, to remove an inflammation of the Pleura, beſides withdrawing blood by a free Phlebotomy or Scarification, alſo the ſerous and other excrementitious humors ought to be gently ſolicited and excerned as well out of the maſs thereof, as out of the bowels, by Stool, Urine and Sweat. The more ſtrong Purgatives are deſervedly prohibited, becauſe they diſquiet the blood, and conſtrain it to be impacted more deep into the places affected. And that certain renowned Chymiſts, viz. *Angelus Sala*, *Hartman*, *M. Rulandus*, with many others, do audaciouſly exhibit Vomits of Stybium to any afflicted with a Pleuriſie, and magnifie it for the beſt remedy, ſeems to me neither ſafe nor congruous to reaſon; the only reaſon of helping, as I think, and that very uncertain and full of danger, may be, *viz.* that the medicine operating more vehemently while the Patients ſuffer exolution of ſpirits or ſwoonings, all the vigour and turgeſcence of the blood abates, and for that cauſe the nervous Fibres remit their wrinklings or painful contractions, and the Veſſels carrying blood being much emptyed, do ſuck up the morbifick matter: In the mean time, there is danger leſt the humors being violently diſturbed, ruſh more impetuouſly to the part affected; at leaſt, leſt the Spirits being too much dejected, and the work of Nature diſquieted about the digeſting or ſeparation of the morbific matter, ſtrength ſhould utterly fail, before the diſeaſe be cured. Yet in the mean time, Clyſters are of frequent or daily uſe: yea ſometimes more benign ſolutive purgatives are allowed, provided that the Feaver be not very intenſe. Julips and temperating Decoctions and things gently moving Sweat and Urine, as we have preſcribed before for a Peripneumonie, are alſo here convenient; but let all hot and ſharp things, whether aromatick, or endowed with a vinous ſpirit be carefully declined.

Whether Purges and Vomites are to be taken in a Pleuriſie.

What other kind of Remedies are convenient in this diſeaſe.

The ſecond Indication preſervatory.

II. The ſecond Indication preſervatory, deſigned againſt the clammineſs and boyling up of the blood, preſcribes Medicines of that ſort which conſiſting of a volatile or alcalizated Salt, do deſtroy the combinations entred into, of the acid and fixed or otherwiſe diſtempered Salts, with the other more thick particles. For which intent the Eyes or Claws of Crabs, the tooth of a Boar, the ſtone of Carps, the jaw of a Pike Fiſh, the Bone in the Heart of a Stag, the Priapus of a Hart, Sal Prunella, Salt of Coral, Salt of Urine, or volatile Salt of Harts-horn, powder of Goats-blood, infuſion of Horſe-dung, Spirit of Harts-horn, of Salt Armoniack, Spirit of Tartar, the ſimple mixture, mineral Bezoar, Diaphoretick Antimony, flowers of Salt armoniack, are very famous Remedies in a Pleuriſie.

The third indication vital.

III. The Third indication vital which provides that the ſtrength and vital heat be preſerved during the courſe of the Diſeaſe in due tune and ſtate, gives in precept firſt an apt kind of food, and moreover Cardiac and Anodyne remedies, and thoſe which ſeaſonably occur to other ſymptomes, if perhaps they ariſe. Firſt, in a true Pleuriſie, a moſt thin Diet ought to be appointed, *viz.* of meer Oatmeal and Barley; and for ordinary drink, a Ptiſan or Poſſet-drink rather than Beer alone is convenient: although in an outragious thirſt this alſo is to be allowed of in a moderate quantity. Moreover, for quenching thirſt, Juleps, Apozemes, and Emulſions are taken by turns; to all which add Sal Prunella. Secondly, let only the temperate Cordials be adminiſtred which mildly do recreate the animal Spirits, and not at all intend the kindling of the blood, burning out of its due proportion. For theſe intentions, the water of *Carduus Mariæ*, *Carduus Benedictus*, of Balm, Borage, Cowſlips, Black-cherries, are uſually given with ſucceſs: whereto let the powder of Pearls and Coral be added. Thirdly, It behoveth to adminiſter Anodynes, both inwardly, to provoke ſleep in caſe it be very much wanting, and alſo externally, to alleviate the pain of the ſide. Of the former kind the more uſual are the diſtill'd water, Syrup and powder of red Poppies, which are eſteemed Specificks in a Pleuriſie and in a Peripneumony: Moreover, when the pain is very acute, and watchings inſtant upon the Patient, they may lawfully drink Diacodiates. Againſt pains, Liniments, Fomentations,

Cardiacks.

Anodynes.

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tions, Cataplaſmes, and ſometimes the hot bowels of Animals newly ſlain are convenient to be applied. Theſe are the principal Intentions of healing which ſeem requiſite to cure an exquiſite and ſimple Pleuriſie, before it contracts a Peripneumonie to it ſelf, or paſſes into it or into an Empyema. It only remains to adapt to each of theſe the more ſelect forms of Medicaments.

Forms of Remedies.

Firſt therefore in the beginning of the Diſeaſe, for taking away the Phlegmon, Juleps, Apozemes, Powders, and gentle looſening Clyſters are wont to be preſcribed.

Firſt for the removing the Inflammation.

Take water of Carduus Mariæ eight ounces, red Poppies 4 ounces, Syrup of red Poppies one ounce, ſal Prunella one drachm, make a Julep, the doſe two or three ounces every third hour.

Juleps, & Apozemes.

Take of Graſs-roots 4 ounces, Barly half an ounce, Apple-parings one handful, Raiſins one ounce, Liquoriſh two drams, boyl them in three pints of Spring-water to two; clarifie the ſtrained liquor, adding Syrup of Violets one ounce and half, Sal Prunella one dram and half, make an Apozeme, the doſe 3 or 4 ounces often in a day.

Powder.

Take of Sal Prunella two drams, flowers of Nitre one dram, powder of red Poppy flowers two ſcruples, Sugar-candy four ſcruples, make a powder, the doſe half a dram three or four times in a day.

A Purge.

Take of the Decoction of Mallows, leaves and roots, with Prunes, one Pound, Syrup of Violets three ounces, Sal Prunella one dram, make a Clyſter.

Take Caſſia bruiſed two ounces, Tamarinds one ounce, Damask-Roſe leaves one handful, Coriander-ſeeds two drams, boyl'd in Spring-water to a pint, ſtrain it, and add Syrup of Chicory with Rhubarb two drams, clarifie it with the White of an Egg, the doſe is 5 or 6 ounces in the morning, continued for two or three dayes.

Secondly for the taking away the Ccammineſs of the Blood.

Secondly, The following are of uſe to diſſolve the clammineſs or coagulating viſcoſity of the blood, in the form of a Drink, of a Powder and of Spirit.

An infuſion of Horſe-dung.

Take freſh Horſe-dung 4 ounces, Carduus-water one pound and half, infuſe it warm for two hours, after filtre it, to which add Syrup of the juice of Dandelyon, or of Chichory two ounces, Spirit of ſalt Armoniack one dram, let five or ſix ſpoonfuls be given three or four times in a day.

To this end Water of Horſe-dung wonderfully profits.

And diſtilled water.

Take of Horſe-dung 4 pounds, leaves of Carduus Benedictus, Carduus Mariæ, Scabious, Pimpernel, of each three handfulls, upon them cut and mixt together pour ſix pints of new Milk, diſtill them in common Organs. The Doſe is from two ounces to three, either with it ſelf or with other diſtill'd Waters, in form of a Julep.

For the ſame uſe, the Tinctures, or the ſolutions of other Dungs are adminiſtred by ſome Phyſicians, and highly magnified by them. *Helmont* commends the dung of an Ox, *Panarolus* commends Pidgeons-dung, others the white dung of a Cock, for the Pleuriſie. *Epiphanius Ferdinandus*, was wont to give with ſucceſs the Decoction of Tobacco with new Wine; *Valeriola* by experiment as a familiar remedy made uſe of the Decoction of the Flowers of red Poppies: The renowned *Sylvius* preſcrib'd the following mixture to be taken by Spoonfuls, within ſhort ſpaces of time.

Sylvius's *Anti-Pleuritick.*

Take Parſly and Hyſop-water, of each two ounces, Fennel-water one ounce, Treacle-water ſimple half an ounce, Laudanum Opiate 4 grains, Salt Armoniack half a ſcruple, Syrup of red Poppies one ounce. Mingle them.

Frederick Deckers adds to this the *Powder of Crabs-eyes*, and *Mineral Bezoar*, *of each one ſcruple.*

Medicines chiefly efficacious for this uſe are wont to be adminiſtred in form of a powder: for examples ſake.

Powders.

Take Powder of Crabs-eyes two drams, Sal Prunella one dram and half, of the flowers of red Poppies half a dram, mix them and make a Powder, the doſe half a dram, three or four times a day, in a convenient Vehicle.

Inſtead

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Inſtead of Crabs-eyes, the powder of the Jaw of a Pike, or the Tusk of a Boar, or the Pizzle of a Stag, or Bull, are uſed, and if they prove ineffective, try the following.

Take of Antimony Diaphoretick, or the Ceruſs thereof, or Bezoar Mineral, two drams, the volatile Salt of Harts-horn half a dram, the powder of red Poppies two ſcruples, make a Powder; The Doſe from one Scruple to half a dram, three times or oftner in a day.

For the ſame intention of curing it was, that *Riverius* gave of the Powder of *Soot* from half a dram to a dram; others the powder of Pidgeons dung, or of a Cock. And indeed by reaſon of this Analogy, whereby the dungs of Animals ſtored with volatile Salt, do ſuccour in this Diſeaſe; it is probable, the dung of a Dog doth no leſs conduce to cure a Pleuriſie than a Squinancy, and ſo much the rather, becauſe theſe Diſeaſes frequently change their forms among themſelves, and one aſſumes the ſpecies of the other. Chymical liquors endued with a volatile Salt do alſo notably help ſometimes in a Pleuriſie.

Chymical Liquors.

Take of Spirit of Blood two drams, Water of red Poppies three Ounces, the Syrup of the ſame one ounce. Let it be given by ſpoonfuls often.

Take Spirit of Sal Armoniack, diſtill'd with Oblibanum, three drams, the doſe from 12 drops to 15 or 20, twice or thrice a day, in any convenient liquor. After the ſame manner the Spirit of Urine, Soot, or Harts-horn may be given.

Take the Spirit of Tartar 3 drams, the doſe one ſcruple in a convenient vehicle.

Take of the ſimple mixture 3 drams; Doſe from one ſcruple to half a dram.

What remedies the third intention requires.

As for the third Intention, beſides a thin diet, Cardiac remedies and Anodynes are preſcribed. Examples of the former kind for the firſt indication may be ſupplied by Juleps and Apozemes; for the ſecond Indication they may be ſupplied by Spirits and Powders. Anodynes are preſcribed to be exhibited inwardly upon watching, and very intenſe pain, according to the following method.

Hypnotick Anodynes.

Take of Poppy-water two ounces, the Syrup of the ſame 6 drams, Spirit of Harts-horn 12 drops, make a draught to be taken at Bed-time.

If we muſt proceed higher, *Take Carduus-water two ounces, Diacodium from three drams to half an ounce or 6 drams, Spirit of Sal Armoniac with Frankincenſe half a ſcruple, make a draught: and ſometimes although rarely Laudanum is expedient, which timely given, inaſmuch as it excites ſleep, and moves Sweat & Urine, does greatly profit.*

Take Cowſlip-water two ounces, Tartariz'd Laudanum from 16, drops to 20. the Spirits of Blood half a Scruple, Syrup of Violets two drams, mingle them for a draught.

External Anodynes.

Outward Anodynes in form of a Liniment, Fomentation, and Cataplaſm, are uſually preſcribed.

Take Oyntment of Marſhmallows two ounces, Oyl of Almonds one ounce, Dogs-turd two drams, mix them by grinding together.

Take the Plaiſter of Mucilages two ounces and a half, moiſtened with Linſeed-Oyl, and applyed upon Lawn-paper.

Take the tops of both Mallows, the leaves of Mercury and Beetes, of each 4 handfuls, boyl them in Spring-water, and ſtrain'd, let it be uſed for Fomentation.

Take the Dregs of the herbs after the liquor expreſſed, to which add the bran of Oats 6 ounces, Linſeed and Fenugreek-ſeeds, of each two Ounces, Oyntment of Marſh-mallows two ounce, make a Cataplaſme.

An Hiſtory.

There is no occaſion to go far for Hiſtories and Inſtances of Patients ſick of a Pleuriſie, for a notable Example of this diſeaſe is now under our hands: to wit, A very lovely Maid, frequently and as it were habitually obnoxious to that diſtemper, is committed to our care. This Virgin being very amiable, of a ſanguine complexion, but of a weakly conſtitution, upon any the ſmalleſt occaſion, *viz.* by taking cold, or by errors in any of the ſix Non-naturals, yea ſometimes from the meer alteration of the year, or the air, has for many years been wont to fall into a feaver; whereupon immediately Pleuritick pains, with a Cough and difficult breathing come upon her, and afterwards for the moſt part hideous Convulſions: under which paſſion in time paſt ſhe did ſo grievouſly labour, that frequently every year for above ſix months ſhe was conſtrain'd to keep within her Chamber. But of late, though ſhe is not acquitted from

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from this hurt, yet ſhe is ſeldomer puniſh'd with it. The laſt year all the Summer, and almoſt the Autumn, ſhe enjoyed her health indifferently; in the beginning of Winter ſhe took her bed with this ſickneſs, and now about the end is again ſick. A pain from the Pleuriſie conſtantly afflicts her right ſide, where the blood ſticking in its paſſage, and being extravaſated about the intercoſtal muſcles, the Fibres being provoked, fall into a moſt troubleſom condition, together with a Convulſive motion of Coughing, and almoſt perpetually repeat it: In the mean while her Lungs being ſound enough, and open as to the paſſages, do readily convey the blood without any ſtop by its clammineſs, (which frequently is the Author of a Peripneumonie.) No remedies that are uſed will do her good without Phlebotomie, which continually is ſo very neceſſary, that upon every return of the ſickneſs, in ſpite of all things we are compelled three or four times to repeat it, and ſometimes oftner: the blood let out in the Superficies hath conſtantly a viſcous and whitiſh filme. This diſeaſe was ever a ſimple Pleuriſie void of a Peripneumonie, and for cure ſhe with conſtant ſucceſs uſed the following method.

Take Spirit of Sal Armoniack diſtilled with Gum Ammoniacum three drams; take from 15 drops to 20, three times aday, with the following Julep.

Take Carduus and Black-Cherry water, of each ſix ounces, Hyſterical Water one dram, Sugar 6 drams. Between-whiles ſhe took a doſe of this Powder with three ounces of Apozeme.

Take Powder of Crabs-Eyes, of a Bores tooth, Sal Prunella of each one dram, make a Powder for ſix doſes.

Take Graſs-roots 3 ounces, candied Eringo one ounce, Shavings of Ivory and Harts-horn of each two drams, the Parings of Apples one handful, Raiſins one ounce, boyl them in three pound of Spring-water to two pound, to it ſtrain'd add Syrup of Violets one ounce, ſal Prunella one dram, mix them, and make an Apozeme.

Clyſters of Milk with Syrup of Violets were injected, ſometimes every, ſometimes every other day. If Opiates, however mild, were given to allay pain, upon it a pain and drowſineſs of the head, and Convulſions did infeſt her moſt grievouſly.

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Of an Empyema.

An Empyema is the product of other diſeaſes of the breaſt.

IT is clearly manifeſt from what hath been ſaid before, that a Pleuriſie, and Peripneumonie, are diſeaſes not only akin but commutable among themſelves and ſucceſſive to one another; Moreover, as well this as that, and frequently both together, not being well cured, do paſs into an Empyema. For when a Phlegmon rais'd about the Pleura is brought to ſuppuration, at length the Impoſthume being broke, the matter falling into the cavity of the Thorax, produces this diſeaſe. In like manner ſometimes it follows from the Lungs being inflamed: inaſmuch as the Ichor accumulated about the place affected, turns into a thick and yellow humour by a long digeſtion, which unleſs it be ejected by a Cough, either ſenſibly corrupting the inner ſubſtance of the Lungs, it cauſeth a Conſumptive diſpoſition, or diſſolving the unity of the intire Lungs, and at length corroding the outmoſt membrane, it ſlides down into the Breaſt, and ſo engenders an Empyema. Any one labouring with an Impoſtume or Ulcer of the Lungs, although he do ſpit out abundant and fœtid matter (as it frequently happens in an Impoſtume of the Lungs,) is not therefore accounted obnoxious to an Empyema. For in truth, by the common acceptation of this Term is ſignified a Collection of rotten matter within the cavity of the Thorax, by which the Organs of breathing are oppreſſed: but that rotten matter is wont to have a conflux thither either by a Pleuriſie or Peripneumonie, (and ſometimes perhaps from a Squinancy) brought firſt to ſuppuration and afterwards broke.

It rarely or never begins of it ſelf.

Foraſmuch as an Empyema never begins primarily and of it ſelf, but for the moſt part is the effect or product of other diſeaſes, not duely Cured, it will not be requiſite to make much inquiſition about the cauſes thereof. The formal reaſon or conjunct

conjunct cauſe thereof is known well enough (to wit) it is a purulent matter, poured out from the Pleura, or the Lungs, or the Larinx, into the cavity of the Thorax. But the other proper cauſes of the previous effects, appertain to the Etiologies of every of them.

What the morbific matter is.

There is a certain diſpute about the morbific matter; for ſome contend that it is meer corruption, others not that, but that it is a purulent matter, of which opinion is *Johannes Heurnius*, who averring a purulent matter for the conjunct cauſe of an Empyema, diſtinguiſhes between this and mere and pure Pus, affirming this to come to paſs *from a bloody nutritious humour*, i. e. *from the blood it ſelf ſomewhat corrupted, but capable of digeſtion, but that a purulent matter is an excrementitious humour*, viz. *a Serum or Ichor*, which proceeds from the blood obſtructed and hindered ſomewhere in its Circulation. From hence we may obſerve concerning an Impoſthume which affords true and laudable *Pus* or matter, that it is for the moſt part compact, every way ſhut up and wrapt up together either in a bladder, or (as it were) within private Apartments, and then after it is maturated and broken, pours out the contained humour, and is ſoon and eaſily healed. But an Impoſthume affording a purulent matter forms its neſt not ſo bound up and encompaſs'd by walls, but for the moſt part unequal and crooked, and being broken rather pours out filthy blood or gore than matter or Pus, and then by reaſon of the ſucceſſive ſource of excrementitious humour, it is very difficultly healed.

The difference of Pus and a purulent matter.

Moreover, we are to conſider, that each humour as well Pus as purulent matter doth ſometimes ſtink notably, and is alſo ſometimes very free from any bad ſavour. Some maturated and broken Impoſthumes pour out fetid matter, others matter without any ſmell. I have often obſerv'd Impoſthumes of the Lungs, as well as Phlegmons of other parts to have this ſeveral diſtinction. Purulent matter from many Ulcers ſtinks ill; the Spittle of Conſumptive perſons which is eſteemed to be very dangerous, for the moſt part is without any ſcent. It is uſual where the ſide is opened by reaſon of an Empyema, that at firſt the matter flows out not unſweet, but after two or three days the air having more frequently enter'd into the orifice, it ſtinks moſt horribly: which ſtench notwithſtanding after an injection of ſome aromatical or vinous Spirit vaniſhes again in a ſhort ſpace. But it would be a thing of much tedioufneſs to denote the particular reaſons of each of theſe accidents and alterations, for that never ſo little alteration of Pus or purulent matter, both cauſes and removes that ſtench from them. When the ſulphureous Particles are equally digeſted, and being ſubjugated to the ſalts are contained in a mixture, there is no ſtench; but as ſoon as they being looſed begin to fly away, and carry the ſalt particles with them (whereby they are ſharpened) they diſperſe a very bad ſtench round about. But whereas an Injection or Lotion with vinous and aromatical liquors, being ſometimes adminiſtred to a putrid Ulcer or neſt of an Empyema, frequently removes all ſtench; the reaſon is, becauſe the ſides of an Ulcer, no otherwiſe than as a ſtinking pot, infect the contained liquor as with a certain ferment, and ſo impreſs a ſtink: but when that ferment of the veſſel or bowel is waſhed or overcome by a well-tempered and ſtrong liquor, then that propagation of a ſtench ceaſeth. From hence follows not always an ill ſign, nor is it ſo very good, if the Spittle of conſumptive perſons, and the Impoſthumes of ſuch as are Empyematical are excerned either with, or without ſtench; for that I have known it to have been to ſome healthful, and to others deadly in either caſe. Moreover a more certain Judgment it not to be taken from thence, that the Spittle of ſome Conſumptive perſons floats upon the water, and that of others ſinks.

Why both ſometimes with and ſometimes without ſtench.

But although we do not much diſapprove of that diſtinction of Pus and purulent matter, notwithſtanding we adjudge neither only this, nor always that, to be a conjunct cauſe of an Empyema. Whenas this diſeaſe ſucceeding a ſimple Pleuriſie, ariſes from an Impoſthume being ſuppurated and broken in the ſide, it is moſt commonly pure and meer Pus, which falling into the Cavity of the Breaſt, engenders that diſeaſe. But if an Empyema be an Offspring of a Peripneumonie (unleſs an Impoſthume of the Lungs intervene) the ichorous matter being accumulated about the place of the phlegmon, and after thickning by meer concoction, it wounds the Lungs, and at length making a hole through the membrane encompaſſing it, and flowing out into the Thorax, produces an Empyema. That matter is rather to be accounted purulent than meer Pus.

Neither the cauſe of an Empyema.

The ſigns of an Empyema either prognoſticate it while it is in *fieri*, or indicate it plainly done. Some foregoing diſeaſes are eſteemed of the former ſort, whoſe iſſue this uſes to be, of which ſort are the Pleuriſie, Peripneumonie, and Squinancy, alſo ſometimes a ſtroke or wound of the breaſt, and ſometimes other diſtempers thereof, not

The Signs of an Empyema whilſt beginning.

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not well cured, nor discharged; out of which the suspicion will be greater of an Empyema to ensue, if after one or two weeks without abundant Spittle, the shivering of an Ague and fainting of the Spirits overtakes one. Then after fourteen or twenty days, there will be signs of an Empyema fully made, as difficult breathing, a heavinesse of the breast, a swimming to and fro of the matter, and a sense of pain from the position of the body chang'd, thirst and a small feaver almost continual, redness of the cheeks, disquietness of the whole body, and watching.

When perfect.

An Empyema is distinguished many ways, *viz.* First according to the distemper going before, whose Offspring it is; also according to us seat, one while in the right side of the breast, another while in the left, and another while in the whole capacity thereof; and lastly, as to the morbific matter, which is either meer and laudable Pus, or purulent matter, and this one while gentle, and benigne, and another while sharp and stinking.

Prognosticks of this disease.

Prognosticks of this disease begin as well before as after incision; the former determins whether the side ought to be opened or not, also it presages of what sort the event will be, either with or without opening. If an Empyema succeeds more slow, after the first distemper, to wit, not before the thirtieth or fortieth day, whenas the strength is very much worn, and the Lungs are vitiated, and their structure hurt; and also if a feaver remain as it were hectick, the breathing short and painful, the Pulse weak and quick, with cold sweat, and with a Diarrhea or wasting loosness, and frequent faintings of the Spirits, then the state of such a person being evidently desperate, doth not admit of any opening; let a Physician suffer him to dye without bleeding, lest he seem to murder him. But if on the contrary, after manifest signs of an Empyema more maturely perfected, the painfulness of the Lungs or side, as also the feaver and other symptoms abate, and the Pulse, and strength of the Spirits are in vigour, it will be lawful safely to advance to cutting, and thereby to hope a happy success. Incision being made, if white Pus duly concocted or otherwise laudable skip out with ease, and thence the heavinesse of the breast and difficult breathing abate, and the Patient is better as to the other Passions, there will not the least doubt remain of his cure: but if no Pus, or that which is bad, if thin, something bloody or stinking, flow from the side being opened, we can conceive thereby but small hope of recovery.

What it signifies when the Probe is guilded by the Empyematical matter.

Hippocrates among the presaging signs of a mortal Empyema, recounts that of the Probes being coloured by the Pus, as by fire; or what we often observe and sometimes without any evil event, if the silver Probe being put into the orifice of the open'd side, be presently ting'd with a colour as it were of Gold or Copper; which surely signifies no other thing but that the sulphureous particles of the Pus, or purulent matter are so exalted, and loosen'd from the bond of mixture, that easily departing they may be affix'd to any other body, and especially silver, whereunto they are akin. Sometimes I have seen Venison kill'd by long and weariſome hunting, presently bak'd in an Oven for Entertainment, become not only most tender, insomuch that it might be taken out with Spoons, but even to have guilded a bright silver Spoon at the first touch. The reason whereof is the same with the former, *viz.* that the flesh was so disposed to putrefaction by too much exercise while the Animal lived, that the particles of the Sulphur being exempt from Concretion, and apt to fly away, presently adhere to any other fit Subject: But this by the by.

The cure of the disease.

As to what belongs to the curatory part of an Empyema, we ought chiefly to consider whether the signs of this disease, as being now perfected, be certain, or doubtfull. In the former case there will not be much need of medicine, but the body only being prepar'd before-hand, we may immediately proceed to the opening of the side. Wherefore, if from a Pleurisie or Peripneumonie not rightly cur'd, or from blood poured out after a stroke, fall, or inward wound, a fluctuation of Pus or purulent matter, or bloody within the cavity of the Thorax, he perceived, with no Spittle, or with little, there will not be need that we dwell longer on maturing or expectorating Medicines, but the belly being loosened, and the blood and humours rightly temparated by Juleps, Apozemes and Anodynes, either that a bare Section be ordained; or that in tender and fearful persons a Cautery be applyed between the *6th* and *7th* Vertebra, and after the Eschar is rais'd the Incision-knife be obliquely forc'd by little and little, towards the hinder and upper part, until it penetrate into the very Cavity of the Thorax; afterwards, a little silver Pipe being put in, let the contained matter be sent out by degrees; notwithstanding in such manner, that, if his strength will bear, an evacuation of the whole humour be accelerated; for a portion thereof being left within, often contracts a hideous stench, within a few days (by reason of the Air, as is abovesaid, being admitted) which evil, that it may

The cutting or opening the side.

The Empyematical matter is want to stink by the often admission of the Air.

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be provided againſt, or ſoon removed, a vulnerary and abſterſive liquor is to be caſt in twice or thrice aday by a Syphon or Syringe. It will not be requiſite to preſcribe particularly the other things belonging to this operation, and the proceſs thereof; for that each of theſe things are evidently known to any of the more expert Chirurgeons, and are uſed in familiar practice. After inciſion and the appertaining adminiſtrations rightly performed, there will not be much beſides left for a Phyſician to doe. It is convenient there be a right courſe of Diet, a frequent looſening the belly (as often as need ſhall be) by Clyſters; and moreover it behoveth us to preſcribe remedies vulgarly called Vulnerary, which hinder the diſſolution of blood, and the profuſion thereof into ſeroſities injurious to the breaſt.

Thoſe things which perſwade or forbid a Paracenteſis.

But if the Signs of this Diſeaſe be leſs certain, and (as for the moſt part it is wont to be, from a Peripneumonie and Impoſthume of the Lungs going before) altogether doubtful, Inciſion muſt not too ſoon or raſhly be made. For I have known ſome ſpitting forth a purulent matter, yea a fetid Pus, with painful breathing, and heavineſs of the breaſt, to have undergone a Paracenteſis in vain, and not altogether exempt from hurt. Wherefore, until it is apparent by pathognomic ſigns that it is an Empyema confirm'd, expectorating medicines (as are before preſcribed for the cure of a Peripneumonie) as alſo things gently moving evacuation by Urine and Sweat, may be uſed for ſome time: But theſe availing nothing, and the Empyema ſtill remaining or increaſing, (becauſe whileſt there is ſtrength it is better to try doubtful Medicines than none) proceed to a Paracenteſis.

Forms of Remedies.

As to the Forms of Medicines requiſite to the curing an Empyema, before Inciſion, the ſame remedies that are preſcribed in a Peripneumonie are convenient; but the Paracenteſis being made, theſe following will be chiefly in uſe.

Againſt fainting of the Spirits, and ſwoonings which happen in that operation, or afterwards, let the following Julep be at hand to be taken now and then about four or five ſpoonfuls.

Cardiacs.

Take Balm and Black-cherry water, of each ſix ounces, Aq. Mirabilis one ounce, powder of Pearl one dram, ſyrup of Gilliflowers one ounce. Mingle for a Julep.

The following Decoction to be drunk three or four times aday.

A Vulnerary Decoction.

Take of Harts-tongue, Speed-well, Agrimony, Colts-foot, Mouſear, Sanicle, of each one handful, Madder and Chervil-roots of each one ounce, Barly half an ounce, red Cicers half an ounce, Raiſins an ounce and half, boyl them in four pound of Spring-water to half, ſweeten it with clarified Honey, or with Syrup of Mouſe-ear as you take it, to your pleaſure. If a Feaver be wanting, the following Pills may be taken from one ſcruple to half a dram, Evening and Morning.

Take powder of Crabs-eyes two drams, Flower of Sulphur one dram, Sal Prunella half a dram, Spec. Diarrhodon Abbatis one ſcruple, Venice-Turpentine waſhed, make a maſs formed into ſmall Pills, or omitting the Turpentine take the powder from half an ounce to two ſcruples, twice in a day.

An Hiſtory of one troubled with an Empyema, the cutting of whom was mortal.

Examples of perſons ſick of an Empyema are not ſo frequent, and thoſe cured of that Diſtemper more ſeldom. I have known two, unwilling to admit of an Inciſion preſcribed by all means by the Phyſicians, to have fatally expired, and their dead bodies I have diſſected. Alſo I ſaw that operation adminiſtred to two others, whereof one recovered health, the other dyed conſumptive; but the reaſon thereof was, his Lungs being notably corrupted, and his ſtrength utterly loſt, the too late opening his ſide conferr'd no help to him; but did much depreſs his ſpirits, weak enough before, and waſted his ſtrength. He whoſe ſide was opened, had Lungs ſound enough; but from the Impoſthume of the ſide being broke inwardly, the matter falling into the Cavity of the Thorax did ſo compreſs the Diaphragma that he could ſcarcely breathe. The Chirurgeon without a Cauſtick thruſt in his Inciſion-knife between the 6*th* and 7*th* Vertebra, and having made a hole quite through his fleſh, he put in his Pipe. A bloody ichor firſt flowed out, afterwards being drawn away by a moderate quantity at times for three dayes, it flowed out without any ſtench; but afterwards as often as the Orifice was opened, a moſt horrid ſmell came forth, exceeding the ſtench of any Jakes, though ne're ſo ſtinking, and infected the whole Chamber with the ill ſcent: Moreover it remain'd ſo for many days, until by injections made of Myrrh and bitter herbs, boyl'd in Water and Wine, and very often adminiſtred every day, at length it was extinguiſhed; by the daily uſe of which, the morbific matter and at length all the ſordidneſs being waſhed away, all flowing out ceaſed; and laſt of all the

Of another who recovered by that remedy.

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Orifice being closed, the Patient recovered his entire health. I dissected the dead bodies of those who dyed, when by no perswasion of Physician or Friends they would admit of the opening of their side. One I have spoke of otherwhere, the result whereof was, the Pus streaming from the Impossthume raised in the Pleura, and in the intercostal Muscles, and broken internally, had wasted part of the affected place, and of the contiguous Lung, with a Sphacelus or Gangrene, and so corroding the Diaphragma, and a hole being made on the right side thereof, it had descended into the Viscera or bowels of the lower belly: and there in the whole passage of the Ventricle and Intestines, the outer Coats on which the purulent matter had fallen, appeared eaten and discoloured; and at length the purulent matter corroding and boring through the *intestinum rectum*, it came forth through the fundament together with his excrement. The sick man being strong and impatient of any Medicine, endured the tyranny hereof for about two months, but in the mean while he lived miserably, afflicted with a light Feaver, thirst, inquietude, pain of the stomack, and frequent tumbling up and down, and almost with continual watchings. His body being opened after his decease, a most horrid stench, exceeding any Jakes, diffused it self throughout the whole Chamber. The Anatomy of another who dyed by an Empyema, afforded not so vast an effusion of purulent matter. This indeed had its nest in his side, from whence falling into the cavity of the Thorax, and there accumulated in a vast heap, and continually defiling his Lungs drenched therein, it caused a slow and as it were a hectick Feaver, whereby the Patient, being very old, dyed.

The History of one who dyed because he was not cut.

A fourth History like the former.

SECT. I. CHAP. XI.

Of an Impossthume of the Lungs.

Vomica Pulmonis a disease seldom observ'd.

A *Vomica* of the Lungs is something a-kin to an Empyema or Peripneumonie, considering that the morbific matter is always meer Pus, which notwithstanding is generated in the Lungs without a Feaver and Phlegmon, yea without any great Cough or Spittle, as it were silently, and without noise; and frequently this evil doth not discover it self before it kills the Patient. *Galen* makes mention of this in *lib.* 1. *de locis affectis*; but among Authors who have written Systemes and the practical parts of Physick, mention thereof is seldom or scarce to be met with. *Tulpius* in *lib.* 2. *chap.* 10. describes this distemper after this sort. *This evil* (meaning an Impossthume of the Lungs) *lurks in the beginning so secretly that it scarce discovers any signs of it self, besides, in the first place, a little dry Cough, and presently moist; which continuing for some time, the breath is drawn with difficulty, the spirit fails, and the body withers by degrees, although in the mean time the Spittle makes no shew, either of pus or blood; and if the Impossthume break by way of surprisal, the man is kill'd immediately.* It is wont sometimes so to happen, but I have known many who in an Impossthume rising insensibly, being maturated, and at length breaking, have spit up great plenty of fetid corruption; and though with voiding daily such a Spittle, for many weeks, nay months, they became very weak, and as it were, consumptive, yet at length by the help of Medicines after the Ulcer hath been mundified, and dryed, they have recovered their health entirely.

The formal reason and conjunct cause thereof.

This disease, if we search into the formal reason and conjunct cause thereof, is in truth a concourse of ill humours gathered in some part of the Lungs; whose matter although it be heterogene and an enemy to nature, notwithstanding from the beginning appears not sharp, or irritative. For when at first being separated from the blood, it is deposited in some hollow place of the Lungs, perhaps in some bladdery cell, it doth neither raise a Cough nor produce a Feaver; but afterwards when sensibly encreased it compresses the neighbouring Vessels bringing blood, and moreover insinuates into the very blood passing by, incongruous Effluviums; from thence a small Feaver succeeds, with a certain disquietude, and feebleness; and at length being accumulated to its fulness, and maturated by a long digestion into mere Pus; breaking its nest very much distended before, it flows out every where all about. But if the ways are not open for the issuing of the Pus, it incontinently mingles it self with the blood, and either impoysons it, or impedes it from Circulation; or rushing by heaps into the Tracheal passages, it doth fill most of them at once, and so stuffs them, that a sufficient entrance is denied to air to kindle the blood, and presently the vital flame expires:

but

but if this matter find paſſage, and flow by degrees into the Trachea, from whence again it may be preſently carryed away, and ſpit out, there will be then ſome truce of life, with hope and opportunity of cure. And indeed I have known many cur'd of this diſeaſe.

The morbifick matter.

The uſual matter of an Impoſthume of the Lungs is meer Pus, which often ſtinks notably, and by that differs from the Spittle which is ejected in a Peripneumonie or a Conſumption of the Lungs. But whence that matter proceeds in the beginning thereof, and of what diſpoſition it was before it was ripened into Pus, I cannot ſo eaſily determine: becauſe the ſeeds of this diſeaſe being privily ſow'd, and growing up ſecretly, ſpring wholly from an occult original; wherefore its procatarctick or more remote cauſes lye conceal'd, yea while it begins and encreaſes, can neither be diſcovered by any pathognomical Signs, nor can any prognoſtick be deviſed, before it diſcovers it ſelf with a mortal ſtroke, but the whole procedure thereof is treacherous.

Now if after the Impoſthume is broke, and the Spitting up of Pus with an eaſie diſcharge being begun, with a conſtancy of ſtrength, there be means offer'd for ſome method of cure, the chief Indications according to the common cuſtom in moſt diſeaſes will be theſe, *viz.* Curatory, preſervatory, and vital. The firſt commands the matter of the Impoſthume ſpeedily to be diſcharg'd by Spittle, and that the ſides thereof ſhould be cleanſed and healed as much as is poſſible. The ſecond Indication provides againſt the conflux of new matter to that neſt, or other adjoyning places of the Lungs (whence a Conſumption may be engendred). The third reſtores the languiſhing of the Spirits, the loſt ſtrength, and the fruſtrated Nouriſhment.

First Indication.

1. As to the firſt Indication, remedies commonly called expectorating, and of them thoſe that are more hot and ſharp, and do very much cleanſe and drye, but eſpecially (for that for the moſt part here a Feaver is wanting) ſulphureous remedies are expedient; which alſo may be preſcribed according to the following forms.

Forms of Remedies.

Take of Tincture of Sulphur three drams, take from ſeven drops to twenty, at bed-time, and early in the morning in a ſpoonful of Syrup of the Juice of Ground-Ivie, Or,

Take our ſyrup of Sulphur, as before ſet down, 6 ounces, let a ſpoonful be taken at the ſame hours.

Take the dried leaves of Ground-Ivy, Germander, white Maiden-hair, Coltsfoot, Hyſſop, white Hore-hound, Savory, of each one handful, Enula-campane, Orris and Chervil roots, of each one ounce, Anniſeeds half an ounce, boyl them in 6 pound of Spring-water to three pound and a half, adding towards the end White-wine 6 ounces, clarified Honey three ounces. Let the ſtrained Liquor be clarified, and kept for uſe: the doſe 6 ounces warm, three times a day. Or,

Take of Lime-water 6 pound, put it in a Glaſs with a large mouth, hanging in it the following bag.

Take the dried leaves of Germander, Ground-Ivy, white Horehound, of each one handful, Orris and Enula-campane ſliced one ounce and a half, Anniſeeds bruiſed two ounces, Liquoriſh an ounce and half, Raiſins ſtoned three ounces, let them be ſtopt and ſtand cold. Pour out for uſe, the bag remaining.

Take Lohoch Sanum three ounces, Species Diaireos two drams and a half, flower of Sulphur one dram and a half, of ſimple Oxymel two ounces, make a Linctus to be lickt with a Liquoriſh-ſtick.

Take the powder of Hedge-muſtard, Ground-Ivy, of each half an ounce, flower of Sulphur a dram and half, ſyrup of Sulphur (or of the juice of Ground-Ivy) what will ſuffice to make a Lohoch.

Take of fine Mirrh, of white Amber, of each half an ounce, Sulphur Vivum, Auripigment, of each two drams, the rinds of Piſtaches one dram and a half, make a powder for Fumigation, to be uſed in a Paper-funnel, morning and evening.

Second Indication.

2. The preſervatory Indication, aboliſhing the morbific matter, and ſo providing againſt a Phthiſis prone to ſucceed; endeavors the purifying of the blood, and ſtrengthning the Lungs, to which ends, Purgers, Vulnerarie Decoctions, diſtill'd waters and phyſical Drinks, are convenient.

Take of the Decoction of Senna of Gereon (with one dram and half of Agarick) three ounces and a half, purging ſyrup of Apples one ounce, Aq. Mirabilis two drams, make a potion to be taken with government once in a Week.

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The form of the Wound-drink let be the same as was prescribed for an Empyema after opening, or 4 or 6 ounces of the Decoction common in Shops, three times aday, (because here is no feaver.)

Take of Firr-tops 6 M. fresh Ground-Ivy, Hyssop, Sage, Rockets, Hedge-Mustard, St. Barbaries herb or Winter-cresses, of each four handfuls, the seeds of the Sun-flower 6 ounces, sweet Fennel-seeds two ounces, Enula Campane, Orris-roots, of each 3 ounces, being cut and bruised, pour upon them 8 *pound of* Brunswick *Mum or Spruce-Beer, distill it in a cold Still, let the liquor be all mixt, and when used, sweetned at pleasure with syrup of the juice of Ground-Ivy; the dose three or four ounces, three times aday.*

Take of the roots of Sarsaparilla six ounces, China two ounces, of each of the Sanders six drams, Shavings of Ivory and Hartshorn, of each half an ounce, Mastick-wood one ounce, being cut and bruised infuse them in 12 *pound of Spring-water, boyl them to half, adding one ounce of Liquorish, Raisins* 4 *ounces, let the strained liquor be kept for ordinary drink.*

Third Indication.

3. The vital Indication prescribes Cordials, Anodynes, and a convenient course of diet. The same forms of Medicines for the most part are expedient here, which were prescrib'd for an Empyema after incision, and also the same diet as was ordain'd in a beginning Consumption; besides, in this case Asses-milk often-times doth much good. As to the curing of this disease, I have observed, that an Issue made in the side, for the most part doth signally profit. I remember two suffering under this distemper, by coughing up plentifully mere stinking Pus or Corruption after the Imposthume broke, to have been heal'd by this Remedy in a short space of time. The Historie of the Cures shall be afterwards annexed. In both these by a shallow orifice made in the side by incision, meer Pus began within three or four days to flow out, and then the Spittle began to be abated; and after that flowing, encreased from day to day, for some time continued, the Spittle altogether ceased, and the Patient recovered his entire health.

Fontinels in the side very often greatly help in this disease.

The reason of this admirable Effect seems to be, that the part affected of the Lungs, or that which is bordering upon it, while the disease was arising, or before, grew to the very side, and therefore Nature had endeavoured by this way the thrusting forth of the Pus or matter contained in the Imposthume; and for that cause perhaps had made secret passages even to the superficies of the side; wherefore, afterwards an issue being laid open by a knife, the excretion of the morbific matter was conducted thither. It is also probable, that a certain part of the Lobe of the Lungs at first grew to the side in the diseased, and by reason of the cleaving thereto, afterwards the Imposthume had its arise; for whereas the part being almost immoveable, could not be stirred like to the other parts of the Lungs, the morbific matter was deposited there, and was the better able to reside or form its nest there.

Although the Imposthume of the Lungs be thought a very rare distemper with some Physicians, and by *Tulpius* judg'd so mortal, that when it breaks it kills out-right; yet I have known many to have labour'd under this disease, and by the help of Medicines to have recovered their pristine health. We may here describe two or three of the more remarkable Histories of them.

A Gentleman of a middle age, and before strong and continually healthful, finding himself not well, without any apparent cause, contracted as it were a crazie disposition; for being without Pain, without Vomit, Cough or notable Feaver, in a short time grown weak, he became without any appetite unapt to sleep, full of thirst and hot about the Precordia; this person was handled a long while by some Physicians as Scorbutical, and by others as hectical; and after various methods of healing were assay'd in vain, at length the disease sallying out as from an ambush, appeared manifestly. For whilst on a certain night being more unquiet than usual, he tossed himself very much in his bed, all on a sudden the Imposthume breaking in his Lungs, a large quantity of stinking Pus was thrown out by Cough, so that in four or five hours he threw off about two pints. Moreover, after his Cough continuing about two months, he daily spit out purulent matter, thick and very stinking, untill his flesh being consumed, and he wholly spent, was reduced to languishing, and a notable Consumption. From the stench of his Spittle and breath the whole Chamber was so filled, that his Servants or those attending him, could not endure the ill scent thereof.

After the Imposthume was thus broken, I and two other well-known Physicians being advised with, with all circumspection we prescribed Medicines to absterge and heal the Imposthume, and to cleanse the Blood and Lungs, and redeem him from an imminent Consumption. *A Tincture, and syrup of Sulphur, together with Pectoral and Vulnerary Decoctions and Distillations were taken; also Lohochs and balsamick Pills, day after day in a constant course, with Clysters, gentle Purgatives and Diureticks, were taken between*

tween whiles: then these, *Vaporations and Fumigations, as well sulphureous as arsenical, were used morning and evening.* After these things being long and carefully used did help nothing, I often propounded the opening of the Thorax; but the sick man obstinately rejecting this operation, said he would rather dye than be murdered; yet at length, when I assured him that this remedy, or none, was further to be attempted, he began to deliberate with himself, and immediately baring his breast, he suffered me to search a place where I might apply a Cauterie; the business was presently put out of doubt, for a Tumour appeared on the left side of the Sternon, between the *5th* and *6th* Vertebra. Instead of a Cautery, I applyed thereto a suppurating Plaister, and within three days the top of that swelling became red and soft: out of which, being the next day opened, first a thin ichor, and a little after a yellow and concocted Pus flowed out, and afterwards it continued daily to stream out more plentifully: from that time his stinking Spittle began to abate, and within fourteen days it ceased quite; the morbific matter obtaining through that orifice both an easie and more convenient issue. Although by the effect it was manifest, that the passage of that orifice lay open into the breast, and perhaps into the middle of the Lungs, yet no liquor cast in by a Syringe, could either penetrate or be forced in thither: so secret and intricate are the conveyances which Nature forms for her last aids, that by the same passage by which the morbific matter is exterminated, nothing more hurtful can enter. This opening of the side was at length chang'd into an Issue, and a Pease or a wooden pill being put in, there came forth daily for half a year together plentiful ichor; and in the mean time this well-known person, all corruption of the breast being shook off, and the fleshy habit of his body being recovered, became healthful in all respects; and lastly, that issue being removed to his arm, he bears no sign of that nor any other disease in his breast.

After this Cure so by chance accomplished, it hapned I performed another like it, on purpose, not less successfully; for shortly I was sent for to a noble Lady which had been for many years obnoxious to the heat of the Precordia with a Cough. One day, when she coughed she was throughly sensible of something broke in her Lungs, and presently she voided abundance of meer Pus, and that stinking; after that, this kind of Spittle continuing with a Cough, for a week, notwithstanding the use of remedies, seemed rather augmented than diminished, I advised to have an Issue cut in her side, near the very place whence she perceived the Pus to ascend, which she readily granted. Within three days, from the orifice being opened meer Pus began to flow out, like that she discharged by Cough. Then after the morbific matter had issued out by that Fontinel, both the Cough and the Spitting of Pus wholly ceased, and within a Fortnight the Patient recovered her firm health.

After this I was sent for to another, *viz.* a strong man, and as strong a drinker; who being affected with an Imposthume of the Lungs, also spit up an abundance of Pus and very stinking matter. This Patient by a certain rude contumacy abhorr'd any Issue, wherefore he would not suffer any to be made in his side; notwithstanding he took any Medicines offered to him, by a long use of which Remedies he escaped free from that disease: the Medicines whereby he chiefly received help were prepared of Sulphur, as our Syrup and Tincture, taken daily and very frequently. To these for Vehicles were added one while a Decoction, another while a pectoral Hydromel, another while Lime-water, with an infusion of pectoral, as well as vulnerary Ingredients. Moreover Fumigations and Smoaks, especially of sulphureous and arsenical Ingredients, did contribute very notable help.

SECT.

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SECT. I. CHAP. XII.

Of an Asthma.

An Asthma a most terrible disease.

AMong the Diseases whereby the Region of the breast is wont to be infested, if you regard their tyranny and cruelty, an Asthma (which sometimes by reason of a peculiar symptome is denominated likewise an Orthopnœa) doth not deserve the last place; for there is scarce any thing more sharp and terrible than the fits hereof, the organs of breathing, and the Precordia themselves, which are the foundations and Pillars of Life, are shaken by this disease, as by an Earthquake, and so totter, that nothing less than the ruine of the whole animal Fabrick seems to be threatned; for breathing, whereby we chiefly live, is very much hindred by the assault of this disease, and is in danger, or runs the risque of being quite taken away.

An Asthma is denominated from ἀσθμαίνειν (which is to breathe pursie, or difficultly) and may have this description, that it is a difficult, frequent, and pursie breathing with a great shaking of the breast, and for the most part without any Feaver.

The causes of respiration hurt.

The act of breathing depends as well on moving the Lungs, the Structure whereof ought to be of that sort that its passages, and all the pores may perpetually be open, for the free sucking in and letting out air; as from the parts or organs moving them, which by alternate turns of Systole and Diastole, do cause the hollowness of the breast, and consequently of the Lungs themselves to be dilated, and contracted: whereas therefore there are many and divers reasons of disturbance, whereby respiration is prejudiced, for the most part they may all be reduced to these two heads; *viz.* that there is a fault either in moving the Lungs or in the parts or Instruments that ought to move them, and from hence the differences and kinds of this disease are best of all design'd; for according to the various nature and position of the morbific cause, it is called an Asthma, either meerly Pneumonick, proceeding altogether from the passages bringing in air being obstructed, or not enough open; or it is meerly convulsive, which only arises by reason of a defect or fault in the motive organs; or mixt, when either parts conspire in the fault, which origine every great and inveterate Asthma is wont to have; of each of these we will treat in order.

The Ancients allowed the cause of it only from the Bronchia obstructed.

1. The ancient Physicians, and for the most part hitherto the Moderns have only acknowledged the first kind of Asthma, judging the next cause, and almost the only cause of this Disease, to be the straitness of the Bronchia, *viz.* inasmuch as the spaces of those passages, being either straitned together by obstruction, or compression, as often as the use of breathing is required, do not admit of plenty enough of Air, wherefore, for the more free inspiration of air, as shall be needful, the organs of breathing do most difficultly labour, with throes most frequently repeated.

Or vapors from the Spleen or Womb, but erroneously.

But that some are found obnoxious to fits of an Asthma, without manifest taint of the Lungs, it was wont to be ascribed to vapours from the Spleen, Womb, Mesentery, or some other bowel, undeservedly enough; but surely that passion, without the straitness of the Bronchia, or fault of those bowels we have in another place sufficiently evidenced to arise from Cramps of the moving parts, and shall be presently clearly made out. But in the mean time by what means it may arise also from the passages of the Trachea, obstructed, or compressed, it lyes upon me to declare.

After what manner the straitness of the Bronchia arises.

The straitness of the Bronchia, inducing the first kind of an Asthma, is supposed to come to pass by an obstruction, as often as either thick humours and viscous, or purulent matter of blood extravasated, are forced in upon them; or that little swellings as Schirrus's or little Stones, stop up their passages; or finally that a Catarrh of a serous humour suddenly distils upon them. Moreover the same distemper is thought to be raised by compression, as often as matter of that kind (and of every kind of them) shall cleave to the passages of the Pneumonic Arterie or Vein. Surely, an Asthmatical disposition depends upon these various causes and manners of disturbance: but all invasions of the disease, or at least the greater fits are usually provoked by reason of some accidents or occasions. For while the stream of blood sliding and running down gently can be content with a small breathing, it passes through the Precordia without great labour either of Lungs or Breast. But being boyling and passing through the Lungs more impetuously, it requires a more full inspiration of air; for the freer admittance of this through strait passages presently all the breathing organs are alarmed into most frequent throes. Whatsoever therefore makes the blood

to

to boyl, or raises it into an effervescence, as violent motion of the body or mind, excess of extern cold or heat, the drinking of Wine, Venery, yea sometimes meer heat of the Bed doth cause Asthmatical assaults to such as are predispos'ed. It is usual that those who are obnoxious to this disease oftentimes dare not enter into a Bed, only sleep in a Chair, or on a Bed, being covered with garments. The reason whereof is, that the body covered and heated with Bed-cloaths, the blood being a little raised into a more quick motion, and grown hot, requires a more plentiful sucking in of Air than may be supplied from the passages of the Trachea being straitned: for the more blood passes the Lungs each Systole and Diastole, by so much, for the enkindling and eventilation thereof, the Air ought to be more plentifully and quickly brought in and sent forth: to which task (when by reason of the impediments it is not easily dispatched) yet in some manner to be performed, the ultimate endeavors of all the parts appointed for breathing are made use of with a great contention of the whole breast. Moreover the blood being stirr'd, is not only an occasion, but also in some part a cause in those that are Asthmatically predispos'd; for the vessels bringing blood being thereby mere fill'd and distended within the Lungs, compress the Tracheal passages being already very strait, and render them much more close.

Whatever causes an effervescence of the blood is the evident cause of an Asthma.

Why Asthmatical Persons are worse in Bed.

II. A convulsive Asthma (which we judged to be the second kind of this disease, and to be raised without any great obstruction or compression of the Bronchia, from the me re Cramps of the moving fibres) is not limited to one place, or to any peculiar organ, but being of a d ffused energy, it is extended to almost all the parts employed in breathing (whereof one while this, another while that, or some other is in fault.) For a Convulsive affection inciting an Asthmatical invasion, hath regard to the moving fibres of the vessels of the Lungs, to the Diaphragma, to the muscles of the breast, to the Nerves, which belong unto the Breast, or Lungs, nay to the origine of those Nerves planted within the Brain; and whilest the morbific matter dwells in every of these places, hindring or perverting the work of breathing, it brings on the fits of this Disease, as in another Tract we have somewhile since plainly demonstrated. For the animal Spirits destin'd to the Function of breathing, if at any time they are very much molested and constrained into irregular motions, enter inordinately into the Fibres as well nervous as moving of the organs of breathing, and make them for that cause one while to be contracted, another while to be distended irregularly, as also their solemn and equal turns of Systole and Diastole to be varioully disturbed or hindered.

A Convulsive Asthma.

Its Seat manifold and diffused.

The morbific cause or matter provoking the Spirits prepared for the Pneumonic work, as in divers places, so chiefly in these three, is wont to advance its force or power, *viz.* 1. Either in the muscular Fibres themselves, or 2. In the branches of nervous slips, or lastly within the Brain by the Origine of the Nerves.

The morbific matter consists in several places.

1. As to the former, the heterogene matter being inimical to the Spirits, is sometimes shaken off from the Brain into the trunks of the Nerves, and from thence by their passages and slips, if perhaps it shall be in very little quantity, without very great or sensible hurt slides down to their lower ends. And when it falls in the nervous Fibres, and being heaped up daily, shall at length sensibly increase into a great quantity, it begins to trouble the inmate Spirits, and provoke them into Asthmatical Convulsions; which forthwith infest, and are increased by reason of evident causes, neither do they utterly cease, until the stock of matter so accumulated, be wholly dispers'd, and consumed; afterwards when it being renewed arises to a fulness, the fits of that disease return, and are for that cause most frequently periodical, as is manifest to common observation. According to this account we do deservedly suspect the cause of a Convulsive Asthma sometimes to lurk in the muscular coats of the Pneumonick vessels, also sometimes in the Fibres of the Diaphragma, or the Processes thereof towards the loyns. It is not very probable that the nest of this disease consists within the Fibres of this or that pectoral muscle, although in Scorbutical persons from these also possessed with a Convulsive matter, we have known pains to have risen with breathing being hurt.

1. *In the muscular Fibres.*

2. But truly (even as in another place we have not only demonstrated by reason, but by the Observations and Histories of the sick) a Convulsive Asthma is often incurred, as often as the morbific matter sliding down into the Pneumonic Nerves, sticks in some place within their passages, and especially about their foldings: whence as often as it is accumulated to a plenitude it begins to be mov'd and shaken; wherefore the spirits lying lurking, and flowing into the Organs of breathing disturbed, are forced into irregularity, and those spirits presently affect other inmates of the Fibres of the Lungs and breast, and provoke them into unequal and Asthmatical Convulsions. For this cause and the reason of the disturbance, we have declared that not only invasions

2. *Within the Nerves and their enfoldings.*

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invasions of this disease, but also the Precordia being disturb'd thereby the Cardiack passions do arise.

3 Near the Origines of the Nerves.

3. We have clearly unfolded by anatomical observations that the cause of a convulsive Asthma sometimes consists in the hinder part of the Head near the Origines of the Nerves. Surely I have observ'd some Patients, who when, lying sick of other desperate diseases, they were also Asthmatick, found it necessary to be whether in bed or chair with their head always erect, or looking down, but lying on their back or leaning backwards incontinently they gaped for breath as if they were dying, and hardly breathed; the cause whereof (as appear'd by dissection after they were dead) was only a huge collection of sharp Serum which was gather'd within the cavities of the brain; which, if by reason of the head inclining backwards, it fell into the origine of the Nerves of the eighth pair, presently the Precordia, and chiefly the breathing organs were affected with horrid cramps. Moreover sometimes for this very reason it seems that Orthopnoick persons cannot lie down in their bed without danger of choaking, but are constrain'd to sit up with an erect body.

3. A mixt Asthma or partly Pneumonic and partly Convulsive.

III. Although an Asthma is sometimes simple from the beginning, *viz.* either meerly Pneumonical, or Convulsive, notwithstanding after either disease hath for some time encreased, for the most part it gains the other to it self: hence it may be concluded every inveterate Asthma to be a mixt affection, stirr'd up by the default partly of the Lungs ill-fram'd, and partly by default of the Nerves and nervous Fibres appertaining to the breathing parts. For when the Pneumonic passages being straitned or obstructed from some cause, do not admit of a free sucking in, and breathing out of the air, for that cause also the blood, yea and nervous humour, being hindred in their courses, and compell'd to proceed slowly and to stagnate, do fasten their feculency and dregs upon the nervous parts; whence the passages of the spirits are obstructed, or perverted, and at length a Convulsive taint accrues to them. Moreover the blood, being not duly inspir'd and eventilated within the Precordia, at length being vitiated in its temperament supplies the brain and nervous stock but with a depraved juice, whose faults do chiefly punish the Organs of respiration before hurt and debilitated. In like manner also the evil is reciprocrated on the contrary part, as oft as this disease begins by fault of the nervous stock; for as much as the motion of the Lungs is often stopt or hindred, by reason or Convulsions in the muscular fibres, both the blood and the nervous juice being restrain'd from their usual motions, do heap up dregs and filths, fastening them to the parts containing them, by which not only viscous humours and obstructing of the passages, but even Tumours and other more solid concretes vitiating the structure of the Lungs, are produced.

The causes of an Asthma recited.

Therefore if when an Asthma being for some time confirmed and become habitual, shall attain to frequent fits, and those emergent upon every occasion; the conjunct cause thereof, and also the Procuring cause is placed as well inwardly in the Lung it self, as outwardly in the Fibres and Nerves, and in the spirits imploy'd for the function of breathing. Neither will it be difficult, by seeking diligently each of these things, to find in any case of the Patient, as well the chief nests, as nourishment of this morbifick matter. But as to the evident causes they are very many, and also of diverse sorts. For hitherto ought to be referred whatsoever move, either the blood and the other humours, or trouble the animal spirits and force them into irregularities. Asthmatical persons can indure nothing violent, or unaccustomed: from excess of cold, or heat, from any vehement motion of body or mind, by any great change of Air, or of the year, or from the slightest errors about the things not natural, yea from a thousand other occasions they fall into fits of difficult breathing.

The Prognostiks of the Disease.

As to the Prognostick part, an inveterate Asthma is difficultly or scarce ever cured; notwithstanding the medicines and method of healing being rightly ordered, oftentimes great succour is afforded, *viz.* the fierceness of the fits is diminish'd, longer respites are procured, yea, even the dangers of life it self, seeming frequently to be imminent are removed.

The disease growing worse, either threatens a Consumption, or a Dropsie, or some drowzy, or convulsive affect; accordingly as the Serum by reason of perspiration being hindred, being more abundantly accumulated (because the sick cannot sleep enough in their beds) it is either fixed in the Lungs, or tranferr'd into the habit of the body, or into the brain it self. For this very reason the diseased do find themselves better in Summer, when they breath more freely, than in Winter; likewise better in hot countries than in cold, the South or West-wind blowing, than the North or East.

Two chief Indications.

Of the curatory method of an Asthma there will be two chief Indications, or rather so many distinct methods of healing, *viz.* Curatory and preservatory. The first instructs

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inſtructs what is to be perform'd in the fit it ſelf, that the Patient may be delivered from preſent danger; the other by what out of the fit, we ought to endeavour the taking away the morbifick cauſe, leſt that diſtemper be repeated more often or more heavily.

What is to be done in the fit.

1. Therefore a fit urging, there will be two chief intentions of curing, *viz.* firſt that a more free breathing be procured, as well upon the account of air, as of the Lungs, at leaſt ſo far as may ſuffice to ſupport life; and ſecondly, that the organs of breathing may be withdrawn, and reſtrain'd, as ſoon as may be, from the Convulſions begun, and uſually obſtinately continuing.

1. Intention to facilitate breathing.

1. As to what reſpects the former, let the Patient be placed in an upright poſition of body, in a more open place, and pretty airy, free from Smoak and breath of by-ſtanders; then let it be endeavoured that the Lungs being made free from all obſtruction, and inward oppreſſion, and alſo external compreſſion, may be able to draw and change the breath more eaſily. For theſe purpoſes leſt the bulk of the nether bowels compreſs or ſtraiten the Precordia, the belly is to be looſen'd by a Clyſter, the apparel & what ever binds about the Breaſt to be looſened; alſo when in this caſe either from the blood ſwelling up inordinately within the Pneumonic veſſels, or from the Serum diſtilling out of the Arteries and Glandules into the tracheal paſſages, they are wont to be oppreſſed, the impetuoſity and inſtigations of either humour ought to be reſtrain'd and appeaſed; inſomuch that if ſtrength endure. and the pulſe be ſtrong enough, Phlebotomy is oftentimes convenient. Moreover thoſe things are carefully to be adminiſtred which diſpatch away the Serum and ſuperfluities of the boiling blood by urine, as well as ſweatings: to which Intention, Juleps, Apozemes, commonly call'd Pectorals, do notably conduce; yea powders of ſhells, millepedes prepared, Spirits and volatile ſalts, are ſucceſsfully uſed. In the mean time beſides let there be adminiſtred whatſoever opens and makes ſlippery the paſſages of the Trachea, and moves expectoration, and whatſoever, if need be, gives ſtop to a Catarrh diſtilling upon the ſame; for which purpoſes, Lambitives, Lohochs, pectoral Decoctions and ſuffumigations are good.

2 Intention to free from Convulſions the moving parts. Remedies which diſſipate the Spirit profit for this end.

2. As to the other intention of curing in theſe Convulſive fits, *viz.* that the organs of breathing may be reſtrained from the Convulſions begun, and may quietly return to their ordinary task, (unleſs this ſucceeds of its own accord, after the boiling of the blood and Serum in the Lungs be appeaſed) we muſt uſe Antiſpaſmaticks or remedies againſt Convulſions, and Anodynes: for medicines which are uſed to be adminiſtred in hyſterical paſſions, do conduce in a convulſive Aſthma.

Spirit of Harts-horn, of ſoot, and eſpecially of ſal Armoniac diſtill'd with gum Ammoniacum; alſo the tinctures of gum Ammoniacum, of Sulphur, of Caſtor, of Aſa fetida, Syrups of Ammoniacum, Sulphur; Oxymel of ſquils and ſuch like, which becauſe they are of an ingrateful taſt or ſmell, as it were diſſipate the ſpirits and withdraw them from tumults, do ſometimes help notably. But if the ſpirits being outragious cannot by this means be appeaſed, we muſt aſſay Narcotics, that ſome of them being ſubdued the others may be reduced to order: for ſurely unleſs a ſtuffing up of the Lungs, with a great oppreſſion of the Precordia do hinder, Opiates do ſometimes greatly profit. In the dreadful fits of this diſeaſe, when other medicines had effected leſs: I have often adminiſtred ſucceſsfully Diacodium, as alſo Laudanum Tartariz'd. But theſe may not be exhibited without great circumſpection, becauſe whereas more or leſs they hinder breathing (which already is difficult and too much hindred) they frequently bring the Patient into danger of life. Beſides this, that the Pneumonic ſpirits may be diverted from their Convulſions, it is many times expedient to moleſt the ſpirits in other places; for ſome of the ſpirits being in other places afflicted moſt commonly the reſidue as well as thoſe that are ſmitten do diſmiſs their irregularities: Wherefore Veſicatories, Cupping-glaſſes, ligatures, and painful frictions bring help; alſo for this reaſon vomits are ſucceſsfully taken in the midſt of a fit. The ſcope of healing being now deſign'd, after what manner the Patients in an urging fit of an Aſthma ought to be handled, it yet remains for us to propound ſome more ſelect forms of Remedies appropriated to the ſame ends.

Or do bring them aſleep.

Forms of Remedies.

In the firſt place therefore to give a ſtop to the flux of blood and ſerum, and to diſmiſs their ſuperfluities deriv'd from the Lungs by ſweat and urine, theſe enſuing are preſcrib'd.

An Apozeme.

Take the water of ground-Ivy eight ounces, of Rue, Pennyroyal, Dragons, of each two ounces, of ſal prunella one dram and a half, Syrup Byzantinus, red Poppies of each one ounce; make a Julep, take it three or more times in a day, the doſe three or four ounces.

Take graſs roots three ounces, roots of Kneeholm two ounces, candi'd Enula-campane one

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ounce and a half, barly half an ounce, Raisons of the Sun, one ounce, boyl them in three pound of water to two pound, adding to your strain'd liquor sal prunella one dram and a half; sweeten it, if there be occasion, with Syrup Byzantinus or of Violets.

A Tincture. *Take tincture of Sulphur three drams, the Dose six drops to ten, evening and morning in a spoonful of Syrup of the juice of ground-Ivy, or Violets.*

A Powder. *Take of facula of Aron and Briony, of each one dram and a half, flower of Sulphur one dram, flowers of Benzoin half a dram, Sugar-candy half an ounce, Liquorish two drams; make a powder to be taken to half a dram or two scruples twice in a day with the former Julep or Apozeme: or,*

Mixtures. *Take of the powder prescribed two ounces, honey or Oxymel what will suffice, make a Linctus, take about half a spoonful evening, and morning, and at other times lick it with a stick of Liquorish.*

Take Syrup of Horehound, of Garlick of each one ounce and a half, tincture of Saffron, Castor, of each two drams, mix them, take a small spoonful in the fits.

Take of spirit of sal Armoniack with gum Ammoniacum three drams, of snail water, and of Earth-worms of each three ounces, Syrup of Horehound two ounces, mingle them, take by a spoonful once in four or five hours.

Take of the powder of Hedge-mustard, or of ground Ivy gather'd in the heat of the Sun one ounce, of Oxymel simple enough to make a Linctus.

2 The Indication preservatory proposes what is to be done out of the fit.

2. So much concerning the method, and medicines requisite in the fit of an Asthma. The other indication preservatory designing the taking away of the whole procuring causes and the morbific matter contains two parts or distinct scopes of cure: both which for the most part are wont in the practice to be complicated and administred together. One of these endeavours to amend the conformation of the Lungs, if it be any way hurt or faulty, and the other to take off the irregularities of the moving parts and spirits, appointed for them. We shall best answer both these intentions if the remedies vulgarly call'd pectorals, are mixt with anticonvulsives, and the use of these with other medicines respecting the preparation of the whole body and emergent symptomes be apply'd between whiles. For which purposes the method and ensuing forms of remedies may be administred.

Suggests two Intentions of healing.

Forms of Remedies. *Take of Aloes rosata a dram and half, flower of Sulphur a dram, salt of Amber half a dram, Tar what will suffice, make 24 pills, take 4 every, or every other, or every third night:*

or,

Pills. *Take of gum Ammoniacum, Bdellium dissolv'd in venegar of squils of each half an ounce, flower of Brimstone three drams, powder of hedge-mustard and savory of each half a dram, make a mass with Syrup of Sulphur or Oxymel of squills; make small pills, take 3 every evening: or*

Take Hog-lice prepar'd two drams, flower of Benzoin half a dram, salt of Amber two scruples, extract of Enula-campane half a dram, Castor half a dram, Saffron a scruple, Venice Turpentine enough to make a mass, form small pills, take 4 every evening and morning except at the times of purging.

But if this form of Pills will not please, or the above mentioned Medicines profit little, afterwards the ensuing shall be essay'd to free the Lungs from obstruction.

Mixtures. *Take spirit of gum Ammoniacum distill'd with sal Armoniac three drams, the syrup of Ground-Ivy three ounces, magistral Snail and Earth-worm water of each an ounce, tincture of Saffron two drams, mingle them and take a spoonful evening and morning. Or,*

Take Tincture of Ammoniacum three drams, the dose from 15 to 20 drops in a spoonful of Oxymel, or of syrup of Ground-Ivy. Or,

Take Tincture of Sulphur three drams, dose from 7 drops to 12 or 20 in a convenient vehicle at the same hours.

In like manner other spirits endued with a volatile salt, and mixt with pectoral Syrups and Cephalick waters, may be prescribed successfully evening and morning.

In place of a mixture or an Asthmatical Julep from distill'd-waters in the shops, let this following magistral be prepared for frequent and several uses.

A distill'd Water. *Take roots of Enula-campane, Orris of* Florence, *Angelica, Masterwort, of each four ounces, of Bryony a pound, the leaves of white Hore-hound, Hyssop, of Savory, Penny-royal, Ground-Ivy of each four handfuls, Juniper and Ivy-berries of each a pound, Bay-berries half a pound, sweet Fennel, Carue, Annis, Lovage, Dill-seeds of each an ounce, Cubebs two ounces, Long-pepper, Cloves, and Mace of each an ounce, all being sliced and bruised pour on them eight*

pound

pound of Brunswick *Beer, distil it in common Organs, mix the whole, and as you use it sweeten it with Sugar, or Syrup of Ground-Ivy, or with Oxymel.* PHAR. Part. II.

Moreover in lieu of Oxymel, or any common pectoral Syrups, the ensuing forms of Medicines appropriated to an Asthma are prescribed; and in the first place the Syrup of Enula-campane invented by *Horatius Augenius* and called by his name, and afterwards commended by *Platerus*, *Sennertus*, *Riverius* and other renowned Practitioners, ought to be observed in this place, and used frequently.

Magistral Syrups.

Take of Enula-campane, Polypodie of the Oak prepared of each two ounces, Currance two ounces, Sebestens 15, Colts-foot, Lungwort, Savory, Calaminth, of each a handful, a large leaf of Tobacco, Liquorish two drams, Nettle and Silk-worm seeds of each a dram and a half, boyl them in Wine mingled with Hony and diluted to a pound and half, and with a little Sugar make a Syrup: take it by it self in form of a Linctus or a spoonful evening and morning, or add a spoonful to the distilled water or Apozeme.

Take Florence *Orris-roots, Enula-campane of each half an ounce, Garlick peel'd four drams, Cloves two drams, white Benozin a dram and half, Saffron a scruple, slice and bruise them and digest them warm in a pound of rectified spirit of Wine for* 48 *hours; to it strained add fine Sugar a pound, put it in a Silver Bason upon live coals, stirring it till it flame, and let it burn as long as it will, then the flame being out make a Syrup of it to be taken as the former.*

The decoction of an old Cock.

Moreover hither may be referred the decoction of an old Cock so much magnified by renouned Physicians as well Ancient as Modern, for the cure of an Asthma; which although *Septalius* damn'd for gross and of no efficacy, notwithstanding *Riverius* after him vindicates; and to attest the efficacy of this remedy opposes his own experience to the others. These broths are of two kinds, *viz.* either with or without purgers; and various Recipes of each do remain in practical Authors, all which would be tedious to recount here, we shall propose one or two forms.

This is the common example without purgers.

Without Purgers.

Take of Orris and Enula-campane-roots of each half an ounce, Hysop and Hore-hound dryed of each six drams, Carthamus seeds an ounce, Annis and Dill seeds of each two drams, Liquorish scraped and Raisins stoned of each three drams; let them be prepared and sewed into the belly of an old Cock, which boyl in fifteen pound of water until the flesh depart from the bones, strain it and let it settle: of the clear liquor the dose six ounces, with an ounce of Oxymel simple. Or if the remedy be desired to be solutive, dissolve of fresh Cassia and Manna of each half an ounce in each draught, taken for many days together, and sometimes for a whole month.

Riverius prescribes a convenient form of such a kind of purging broth.

Take Enula-campane and Orris-roots of each a dram and a half, Hysop and Colts-foot of each a handful, Liquorish and Raisins of each two drams, Figgs 4, *Senna cleansed three drams, Polypodie of the Oak and Carthamus-seeds of each half an ounce, Anniseeds a dram and a half, boyl them with the third or fourth part of an old Cock, make broth for one dose to be taken in the morning, let them continue it for twelve or fifteen days.*

The first History of a Convulsive Asthma.

Of many examples of Asthmaticks I shall propound only two singular ones, *viz.* I will describe the History of one who hath been obnoxious to fits of this disease meerly Convulsive, and of another partly Convulsive and partly Pneumonic. A Noble Person, proper and well set, and formerly healthful enough, after that by chance he had struck his side against some solid body, from that time contracted a hurt, and afterwards an Asthmatical taint. For we may suspect, a certain folding of the Nerves belonging to the Precordia placed near was prejudiced by that accident, and from such a cause afterwards this distemper derived its Origine, *viz.* at some incertain times the pain at first troubled him about that place, and presently a most painful Dyspnœa ensued with a laborious and lasting contention of all the breathing parts; insomuch that while the fit lasted the Patient was thought to be in the agonie of Death: I was first sent for to him after labouring for two days with such an invasion of the Asthma that he was accounted in a desperate condition; Notwithstanding finding his Lungs without hurt, our Prognostic willed as yet to hope well, and immediately by a Consultation of other Physicians it was prescribed as followeth.

The Cure.

Take of Spirit of Gum Ammoniacum distill'd with salt of Tartar three drams, take from

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15 to 20 drops in a spoonful of the following Julep, drinking after it five spoonfuls, repeat it every sixth hour.

Take elder flower, Cammomile, and Penyroyal water of each four ounces, Snail-water two ounces, Sugar one ounce, mingle them, between whiles he took a dose of the following powder with the same Julep or Pectoral decoction.

Take Powder of Crabs-Eyes two drams, Sal Prunella a dram and a half, Salt of Amber half a dram, mix them, divide it into eight doses.

Large vesicatories were applied on the inside of his arms near the Arm-pits, Clysters daily administred, and frequent frictions. By the use of these he received sudden and unexpected help, and within a few days became wholly free from that fit. Afterwards as often as he had any preception of the first motions of this disease, presently he took a large dose of that Spirit with the same Julep 3 or 4 times aday, by which remedy often used, one while for preservation, another while for the cure sake, he was void of any outragious invasion from his habitual Asthma for above two years, in the mean while suffering some more light assaults but easily blown off.

The second History of a mixt disease.

A very Honourable old Gentleman dignified by many great Titles, himself being greater than all them, after that for some years he had liv'd every Winter obnoxious to a Cough and a moderate spitting, and gentle enough, at the end of the last Autumn returning from a long journey he was less healthful (as it was thought by cold he had taken) for he complained of a pain in the middle of his breast next the sternon, which growing worse in an evening, as soon as warm in his bed, wholly disturbed his sleep, and most part of the night was very troublesome: notwithstanding without any Dyspnœa or evident sign of an Asthma. To take away this pain both Purging and Bleeding were used, pectorals and antiscorbuticks were daily used, liniments or fomentations were applied to the place pained, yet without any great success or ease: for the alteration which happened afterwards declined rather to worse; for a difficult and obstructed breath came upon the pain's growing a little more remiss, so that from his first sleep, or inclination thereto he became Asthmatical and gaping for breath, and suffering about the Precordia he was constrained to sit upright in bis bed. Moreover a dyspnœa of this kind and a Convulsive agitation of the breathing parts did not only return every evening, but from day to day were rendred more outragious and lasted a longer time; insomuch that one night waking from his sleep, for many hours he was assaulted with a most painful fit of an Asthma which had almost kill'd him. The Physicians being at a great distance from him, although desired about midnight came not while the morning following, mean while by reason of bleeding used by a Barber this worthy Gencleman revived, being redeemed from the jaws of death; but afterwards by the Consultations of the Physicians that day a slender diet and loosening the Belly by a Clyster were prescribed: In the evening and early in the morning he took of Spirit of gum Ammoniac distilled with sal Armoniac 12 drops in a proper vehicle, and continued the use for many days after; Vesicatories were applied on the inside of his Arms near the Arm-pits; moreover Juleps and Pectoral Decoctions, Lohochs, Clysters, and also mild Purges were taken by turns; also Phlebotomie was repeated after two days. Whereas formerly he was used to drink for his mornings draught a Pint of Ale with Worm-wood and Scurvy-grass, in the room of that about eight a Clock he took 15 drops of Elixir Proprietatis tartariz'd in a draught of Coffee made with Sage. By these remedies his Asthmatical fits presently abated of their fierceness, insomuch that the beginning and end of every night were quiet enough, but in the middle light troubles about the Precordia kept him from sleep, sitting upright an hour or two. Certain other Medicines were propounded by the Physicians, and others of diverse sorts privately offered by his friends, which notwithstanding the Honourable Person utterly rejected, or soon loath'd; and that the rather, because, Winter then being almost spent, his restauration was hoped for by the coming on of the Spring and enjoyment of the Country air without the help of much Physick. Wherefore of the Medicines above mentioned he used one while this and another while that a little by turns, and sometimes kept holy-day from them all; but in the interim although his Asthmatical invasions little or nothing troubled him as formerly in the night, yet by reason his Lungs were very much obstructed, and a serous humour fallen down into his feet, he was not able to walk fast or ascend steep places, without a painful dyspnœa, being in danger of choaking; and now (while I am writing this) not so much an Asthma or Consumption, as a Dropsie is feared.

The reason of this cause.

The Ætiologie of this case is clearly enough manifest from the above mentioned things, *viz.* one procuring cause of this Asthma was a lung greatly obstructed, insomuch, that whereas the blood boiling, passed through the precordia more impetuously

impetuously, the air requisite for its ventilation could not be admitted in plenty enough; wherefore to supply this defect there was necessity that the Lungs and their motive organs should be provoked into more frequent, and more vehement throes. Afterwards from thence ensutd a convulsive disposition of the fibres moving the breast: for the heterogeneous matter descending into those parts together with the nervous juice, and being gathered to a plenitude, first excited pain and afterwards fierce and periodical convulsions in the pneumonic organs: and now although this latter disposition cease (because the Elastick and spasmodical matter is blunted or extinguished by the serous illuvies) yet the other procuring cause still remains, and hath got another associate, *viz.* a worse Devil than it self, to wit a Dropsie.

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SECT. I. CHAP. XIII.

Of a Dropsie of the Breast.

A Dropsie of the Breast is easily known.

IT is clearly manifest by certain and manifold discoveries, that the Region of the Breast is sometimes affected with a Dropsie; for the sense and sound of water fluctuating, do most evidently demonstrate it in living bodies; and Anatomical inspection in the defunct. But yet concerning the cause of this Disease, and manner of coming to pass, to wit, by what ways, and after what manner disposed, the accumulation of water first begins within the hollow of the Breast, as also how it is sensibly augmented, and frequently insensibly continued until the Disease becomes desperate, is a thing yet in the dark. Whenas there is a general distemper of a Dropsie or an Anasarca appearing, and hath seized on the flesh and cavities, of the bowels every where, or in most places, we are not to admire if that illuvies of waters seize also upon the Pectorals: But besides, sometimes it happens, that the Region of the Thorax, is either first or only overflown, the other parts in the mean time remaining sound enough, or only hurt secondarily.

Its cause is hidden.

About the origine of this Disease, and the manner of generation it is much disputed whence, and by what passages that illuvies of water being found every where in the hollowness of the Thorax, doth come thither. Some Authors do derive it from above, *viz.* that it descends from the head by the Trachea; and others deducing its Spring from beneath, from the cavity of the Adbomen, also sometimes from the Liver and Spleen, by I know not what blind ways, judge those waters to be conveyed into the hollowness of the Breast. But neither of these Opinions challenge our assent, or deserve our arguments to disprove them: for none considering the passage of the blood and humours will acknowledge either this or that way of commerce We cannot but affirm, that the serous humour, raising a Dropsie of the breast, does arrive thither either in a kind of vapour. which being exhal'd from the Precordia, and sides of the Thorax is easily condensed into water; or secondly, that the Serum is there deposited under its own proper form, inasmuch as it flows into that cavity from the mouths of the Vessels, *i. e.* of the Arteries being open. We will anon enquire whether the Lymphaducts or vessels bringing chyle, being any where open, or broke, do sometimes produce that disease.

How many wayes it may be produced.

1. By Vapours condensed there.

1. As to the former, it is so very probable that a Dropsie of the breast takes sometimes its origine from vapours condensed within its cavity, that it is a wonder how it should be otherwise at any time, or that any should live exempt from such an effect. For how much is there of vapour that separates from the boyling blood? and when it waxes cold in the precordia, how can it come otherwise to pass but that the abundant vapour should be condensed in this enclosure into water, even as if shut within a Still? And truly it will not be easie to determine, when the vaporous steams are so uncessantly heaped within the cavity of the breast, what may become of them, how they are consumed, or from thence discharged abroad. Surely we must affirm, they either penetrate the sides of the Thorax, or (which rather seems to be) they insinuate into the pores of the Lungs, and so fly away in breathing Certainly by either way, the vapours of the breast may exhale: and perhaps if either be defective, or hindred, by that means a Dropsie of the Breast may be caused.

2. By Serum depositted there.

2. But moreover, I am apt to think, that this Disease also sometimes happens in another manner (inasmuch as the Serum distills from the vessels in its proper form.) For in a cacochymical constitution of body, or a person very scorbutical, where the watery

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watery and weak blood every where caſts off its ſuperfluous Serum from its own conſiſtence, and every where ejecting it from the little mouths of the Arteries being looſed and open, excludes it from the clew of circulation, nothing is more uſual, than for the cavities not only of the Bowels, but alſo of the Precordia, yea the Brain it ſelf, to be overflown with that watery collection; moreover in ſo general a diſpoſition to a Dropſie, that one while this region, another while that, or another ſhould be firſt and almoſt onely poſſeſs'd; and that alſo ſometimes the inmoſt parts being untoucht, the outward fleſh, *viz.*, the muſcles and their interſpaces are overflown with that ſerous illuvies.

Which ſometimes breaks out from the Arteries.

3. Among the veſſels that pour in the dropſical matter into the cavity of the breaſt, the Lympheducts and parts bringing the chyle, do juſtly fall under a ſuſpicion. What relates to the former, it appears by anatomical inſpection, that a great company of theſe do creep through the whole Lungs, and do tend from their outer parts, ſtretching out themſelves inwards towards the paſſages of the breaſt, and for the moſt part pour out into them their liquour, which being ſuperfluous, they every where ſuck up from the arterious Blood. Therefore whenas theſe veſſels are obſtructed, or are by any means impeded from diſcharging their function, it muſt needs be that a heap of water be accumulated in the Lungs, which afterwards falling into the cavity of the breaſt, will excite a Dropſie in that region. For in truth, this Lympha reſtagnating within the conſiſtence of the Lungs, it often happens that the little bladders called Hydatides, in the outer ſuperficies of the Viſcera are raiſed up, which afterwards being broke, diſcharging the waters into the cavities of the Thorax, they produce there an Aſcites. A diſtemper of this kind is often diſcovered in Sheep, when they dy by heaps of a Dropſie, by reaſon of a moiſt ſeaſon and watery paſture. And ſurely the following Hiſtory doth clearly ſeem to argue, that the Aſcites of the breaſt proceeds from the like cauſe ſometimes in a man, (there being yet a living example of this diſeaſe.) Lately a young man healthful enough and ſtrong, having accuſtomed himſelf to hunting and inſatiable riding, and other exerciſes of the body very immoderate, a while without detriment, at length he perceived a fulneſs in his Thorax as if it were a kind of ſwelling; inſomuch that the left ſide of his Lungs ſeem'd to begin to ſwell, and his heart to be thruſt out of its place towards the right ſide, for that he perceived the pulſation thereof to be on that part chiefly. After he had been for ſome time in this condition, on a certain day he felt as if a Veſſel had been burſt aſunder within the cavity of the Thorax, and from thence for the ſpace of half an hour, in that place, as it were the dropping of a humour falling from above into the bottom of his breaſt, was not only felt by himſelf, but could be heard alſo by the ſtanders by. Although he was at firſt ſurprized with the rarity of this affect, yet for that he was wellenough as to ſtrength, appetite, ſleep, and other natural functions, immediately after he became ſecure, and negligent of Medicines; But afterwards by any motion, bending or ſtirring of his Body, a fluctuation of water gathered within on his left ſide, was felt by him; moreover, the motion and ſound was evidently perceived by others, either by handling, or by the ear. As without doubt this Gentleman was affected with a Dropſie of the Breaſt, ſo it ſeemed moſt probable that the diſeaſe had its original from thence, in regard the lympheducts relating to the left ſide of the Lungs, being firſt obſtructed near their inſertions into the paſſage bringing the chyle, did ſwell up to a great bulk, and afterwards being broken diſtill'd their humour into the cavity of the Thorax.

3. *And ſometimes from the Lympheducts.*

A remarkable hiſtory of the like caſe.

When now an Inundation of the Precordia, and ſo of the vital Fort, was imminent, this Gentleman at length, thinking it time to provide for himſelf, entered into a courſe of Phyſick, and carried certain Medicines into the Countrey for his cure, yet without any ſignal ſucceſs. Afterwards coming to *London*, he firſt conſulted the worthy Dr. *Lower*, being of his former acquaintance. He propoſing the opening of the Thorax for his only remedy, took care that the worthy Dr. *Micklethwait* and my ſelf ſhould be ſent for to the conſultation. Immediately an inciſion was appointed by the conſent of us all: wherefore, after proviſion for the whole being made, a Chirurgeon applyed a Cautery between the ſixth and ſeventh Vertebra, and the next day he put his Pipe into the Orifice cut into the cavity of his Breaſt; which being done, immediately a thick liquor whitiſh like Chyle, and as it were milkie, flowed out. There was about ſix ounces only taken from him the firſt time, and the next day as much more. The third day when a little greater quantity was ſuffered to come out, being affected immediately with great fainting, and afterwards being feaveriſh, he was ill for a day or two. Wherefore it ſeemed good to ſtop the iſſue of that matter till he recovered his temperament and ſtrength: but afterwards a ſparing Evacuation of the ſame matter being daily made, the cavity of his Breaſt was wholly emptied: but as yet he wears a pipe in the orifice with a tap, which being opened once in a day and a nights ſpace,

The reaſon thereof.

The Cure by a Paracenteſis of the breaſt.

a very little of the humour flows out; in the mean while, being well in stomach, visage, and strength, he walks abroad, rides, and performs all exercises he was formerly accustomed to, vigorously enough. He used not (neither was there need of) much medicine, only after the Incision we advised temperate Cordials, *viz.* powder of Pearles, Juleps, and sometimes Hypnoticks, and afterwards a vulnerary decoction to be taken twice aday.

By this method, and these forms of Medicines sometime continued, this worthy person seemed to recover his temper, and his strength, and the habit of his Body, and his breast exempt from the Dropsie. Notwithstanding he still wore a silver Pipe in the orifice of his side (out of which ichor daily flowed): and when after some months this being withdrawn, the Issue was shut up, a gathering of the same humour was made within the hollow of his Breast, perceivable by the sound and fluctuation thereof: but when that the disease returning, the same medicine was to be used, and incision of his side appointed, (Nature by chance discharging the function of a Chirurgeon) the matter being prone to burst out, and flowing to the place made its own way. He is now necessitated (for preventing the illuvies of his Breast) to keep that orifice constantly open like a sink.

From these things I think it manifest enough, that an Ascites of the Breast, sometimes arises from the lymphatick vessels burst asunder within the Lungs; neither doubtless but that the same affection may be caused from the Chiliferous passages being broke within the Thorax; notwithstanding, this chance so rarely happens, that as yet I have not known it by my own observation, or others relation. Moreover, it little avails to make inquisition into the Ætiologie of such a disease, because it is not only apparently incurable, but in a short time mortal; because the Precordia are incontinently overflown by the inundation of the chyle, and also the blood and the animal spirits being defrauded of their wonted supply of nutritious Juice, are immediately dissolved.

The differences of this disease.

From the various causes of this Disease even now set down, it will be easie to collect its differences: For first a Dropsie of the Breast, is either simple and primary, peculiar to this Region; or secondary, coming upon a general Dropsie, as it is wont often to be in cachectic persons. Secondly, this Disease is distinguished as to the places affected, *viz.* forasmuch as water is either collected in the whole breast, or only in one side thereof. Thirdly, as to the matter accumulated in a pectoral Ascites, which one while is limpid and plainly wateriſh, another while more thick, whitish, and as it were milkie, such as we have described in the foregoing History.

The Diagnostick signs.

The diagnostic signs do manifestly enough discover this disease: *viz.* the fluctuation of water is perceived by handling, and by feeling at every bending of the body, and the sound is clearly heard. Moreover they are affected much with a dry and empty Cough, as also with a Dispnœa almost continual and painful, especially while they ascend steep places; Besides, they have a thirst, with a feaver, and in the night after the first sleep, great disquiet and tossing of the body, proceeding from the vapours being elevated by the heat being more intense. Sometimes there comes upon these a Palpitation of the heart, an intermitting or disturbed Pulse, and frequent faintings of the spittle. As to the Prognostick, this disease is always difficult to cure, and among the vulgar accounted incurable. And surely if it come upon an Ascites of the Abdomen or an Anasarca throughout the whole body, it is judged not without cause desperate; But if the affection be primary, and happen to a body otherwise sound, we are not altogether to despair of Cure.

The Cure.

What relates to the curatory part of this Disease, the chief Indications will be three, Curative, Preservative, and Vital, according to the common method of curing in most other Distempers.

What Intentions of healing the first Indication suggests.

The first has regard that the water heaped up in the cavity of the Breast by any means be evacuated. The Second provides, that afterwards a new illuvies be not gathered in the same place. The Third procures the restoration of strength, and the symptoms impairing it to be removed with expedition.

The first Intention.

To satisfie the first Indication, and that an Ascites of the Breast may be emptied, there are but two ways or means of evacuation to meet with, whereby this collection of waters may be drayn'd, *viz.* Either that the vessels of the Breast, and the passages of the humours, being emptyed, might suck up that Lympha being rarified, and afterwards by the passages of the blood or air convey them forth: or secondly, that by an incision of the side, those waters may be drained forth plentifully in their own Species.

That former manner although more seldom, yet sometimes succeeds; which I can attest out of my own observation. For the consistence of the Lungs being spongy within

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within, and externally very porous, while by every turn of the Diastole, they are drenched in the underlying waters, they sometimes imbibe them being turn'd into vapour; and so dispatch them to the blood, or continually exhale them with air coming out at the mouth. That an effect of this sort may more easily happen to cure this disease, medicinal aids are taken: For that intention therefore the passages of blood, air, and humours ought to be emptyed as much as may be, and to be kept so empty. For this purpose, Purges, Diureticks, and more mild Diaphoreticks are methodically, and alternately exhibited; also remedies for the breast, and expectorating, challenge here their place; let the Diet be slender and warming, and a government appointed as to all other things of that nature, that the blood may be made to exhale the more, and all the superfluous humours to evaporate. I think good to annex some forms of Medicines accommodated to these uses.

A Purging Hydromel. *Take of Chervil-roots, Knee-holme, Polypodie of the Oak, of each an ounce, Agrimony, white Maidenhair, Oak of Jerusalem, Ground-Ivy, of each one handful, Carthamus seeds one ounce, Florence Orris half an ounce, seeds of Danewort 5 drams, Calamus Aromaticus half an ounce, boyl them in four pound of Spring-water, to the Consumption of a third part, add to it being strained Senna one ounce and a half, Agarick two drams, Mechoacan and Turbith, of each half an ounce, yellow Sanders a dram and a half, Galangal the less one dram, boyl them two hours gently, and close covered, afterwards strain it and add of Honey two ounces, clarifie it with the white of an Egge, make a purging Hydromel. The Dose is from six ounces to eight, in the morning, twice or thrice in a week. Or,*

Take Mercurious Dulcis one scruple, Resine of Jallap half a scruple, Balsam of Peru what suffices to make four Pills, to be taken in the morning, and to be repeated within five or six days.

Tinctures. *Take Tincture of Sulphur three drams, take from seven drops to ten, at night and in the morning, in a spoonful of the following mixture, drinking after it three spoonfulls.*

Julep. *Take of the water of Snails, Earth-worms, and compound Radish water, of each four ounces, water of Elder-berries fermented one pound, Syrup of Juice of Ground-Ivy two ounces, mix them for a Julep. Or,*

Take of Tincture of Ammoniacum, or Galbanum, take twenty drops evening and morning in the same mixture. Or,

Pills. *Take of Hog-lice prepared two drams, flower of Sulphur two scruples, flower of Benzoin one scruple, powder of wild Carrot and Burdock-seeds, of each half a dram, Turpentine of Venice, enough to make a mass. Make small Pills. Take four evening and morning, drinking after them a small draught of the Julep.*

A Lime-water. *At Nine a Clock in the Morning, and Five in the Afternoon, let him take four ounces of the Compound Lime-water, by it self, or with any other proper remedy.*

A Bochet. *For ordinary drink take the following Bochete.*

Take Sarsaperilla six ounces, China two ounces, white and yellow Sanders, of each six drams, shavings of Ivory and Hartshorn, of each three drams, Calamus Aromaticus half an ounce, Raisins half a pound, Liquorish three drams, boyl and infuse them in twelve pound of Spring-water to six pound, strain it.

A History of a Patient. Formerly about twenty five years since, when I resided at *Oxford*, I was sent for to a young Scholar, who suffered for three weeks space under a pain of the Thorax, and a most grievous Dyspnœa constantly troubling him in the evening, moreover, from a more quick motion of body, or going more hastily than usually up any steep place, he laboured extreamly, he could not lye down long on either side, but was necessitated to lye in his bed supine, and his head erect; if perhaps he attempted to lye on either side, immediately pain followed that position of body, and if perhaps he roll'd himself from one side to another, the pain being also presently translated, he felt as it were water to wave from place to place. Hence I had a just suspicion of a Dropsie of the Breast, whereof that I might be more assured, I order'd that lying upon his back on his bed, he would suffer his head to bend backward from the bed-side to the floor, immediately he had a plain perception of water running towards the Clavicles, together with a change of the pain thither. Moreover if at any time he grew more hot than usual, from motion, or in his bed, or by the fire, he presently felt sensibly in his breast, as it were water boyling over the fire, and also complained of a Vertigo, and a small decay of Spirits. Wherefore, when we might lawfully collect out of these things rightly considered, that he was affected with a dropsie of the breast, I prescribed the following method and medicines with success.

The Cure of him. *Take of Mercurius Dulcis fifteen grains, Resine of Jallap half a scruple, Syrup of Roses solutive what suffices, make three Pills. He took them early in the morning and had twelve stools with great ease; afterwards on the third day by the same Medicine he had but four,*

but

but with greater benefit; he took afterwards for many dayes six ounces of the Pectoral and Diuretick Apozeme twice in a day, and lastly repeating the Purge he perfectly recovered. PHAR. Part. II.

SECT. II.

Of Splanchnick remedies, or those which respect the bowels of the lower Belly.

CHAP. I.

Of the Jaundies and the Remedies thereof, and the manner and reason of their operations.

HItherto we have largely enough unfolded the Pathologie and curatory method of the Thorax; now it follows next to finish our task in like manner about the lower Belly. But we have in our former Tract for the most part described already the medicines belonging to this region, and the manner and reasons of their working, together with the Anatomy of the Stomach and Intestines: we have treated of remedies stomachical, dysenterical, and others belonging to the intestines, as also diureticks together with the reasons of them: Moreover we have sufficiently elsewhere handled the ætiologie of Hypochondriack, and Hysterical remedies. What therefore remains, of Hepatical distempers as well proper, as of those vulgarly ascrib'd thereunto, and of their remedies, we will discourse in this Section; notwithstanding in each of these, we will bestow more labour, about the curatory, than pathological part.

Diseases of the Liver.

The chief diseases by which the Liver and the Appendix thereof, are wont to be incumbred, are the Jaundies, and a Tumour, and under this latter many other affects, *viz.* obstruction, inflammation, induration, and schirrus are numbred; to all which are vulgarly appointed remedies commonly called Hepaticks, and which make up a great part of the Dispensatory.

The Jaundies is either a disease by it self, primarily beginning, which is here properly treated of: or it is an effect or product of another disease; as when it arises upon an intermitting Feaver, which oftentimes it puts an end to, of which also we will presently treat by the by.

The Jaundies.

An Icterical distemper by the common consent of most is judged to arise in as much as the yellow choler, not at all, or not enough received, from the ends of *vena porta*, into the passages of the cholerick pore, overflows into the mass of blood and polutes it with its greenness, whereby also the very skin is discolour'd.

The cause of it.

That obstruction is wont to happen after many manners and in various places. For sometimes it happens near the extream ends of either kind of vessels, *viz.* the end of the *vena porta*, and the *porus bilarius*; the interspaces whereof happen frequently to be compressed, and stopt by reason of the Parenchyma of the Liver being tumefied, or otherwise vitiated; wherefore the humour of the gall not being transferred out of the separating vessels of the *porta* into the other receiving vessels, turns back upon the blood. Secondly, the passage of the humour of the gall is sometimes intercepted in the middle passages of the cholerick pore; for that the cavities of these are filled either with a viscous, or sandy, and sometimes with a stony matter; as is plainly discerned in the Livers of beasts in the winter season, while they are fed with hay and straw. Thirdly, it is also manifest by Anatomical observation, sometimes an obstruction in the very bladder of the gall, or in the cystic passage is the cause of the Jaundies; for if at any time, it being filled with stones, receive not the choler, or being here shut up, or grown together, it restrains the descent of the choler towards the guts, that humour although well separated from the blood, is constrained to flow back into the mass thereof, and so propagates the Jaundies.

PHAR. Part. II.

The opinion of Sylvius *of the cauſe of the Jaundies.*

Againſt this moſt received opinion, by which it is judged, that the cauſe of the Jaundies for the moſt part conſiſts on this ſide the *veſica fellis* or about it towards the Liver: the moſt Renowned *Sylvius* altogether places it without this, *viz.* in the Cyſtic or common paſſage. For ſuppoſing the choler not to be ſeparated from the blood, within the paſſages of the Liver, but in the very bladder of the Gall to be propagated of a humour brought thither by the Arteries; He judged the greateſt part, being carried upwards by the paſſage of the *pori bilarii*, to be poured into the blood for ſome notable uſes, and alſo another part to deſcend beneath to the Inteſtines, alſo for neceſſary uſes: wherefore if this latter ſluce be ſhut, all the choler is carried upwards into the blood, and filling it too much with this humour, perverts it from its genuine temper into an Icterical.

But truly leſt the ſtopping of the paſſage of the bladder, or of the common paſſage, (neither of which eaſily happens, or from any light occaſion) may ſeem leſs efficacious to excite any Jaundies; therefore, *whether ſuch an obſtruction hath place, or no*, the moſt Renowned man ingeniouſly ſuppoſes beſides, *The choler while it is generated in the bladder does undergo ſometimes a notable change, by which it is moved, and is born about more plentifully and impetuouſly*, towards the blood, *with which yet it is leſs mingled than it was wont to be, but only confounded together with it, and ſo more eaſily departs from it and infects and tinges the ſolid parts with its colour.*

But that the *choler in the Jaundies may be rendred unfit to mix with the other humours, or to be nearly united*; he determines it to be done, *by a ſpirit too valatile, mixed plentifully with it, and ſo making it more ſpirituous and immiſcible with others.* He confirms this aſſertion by two inſtances, *viz.* in as much as the moſt ſpirituous poiſon from the biting of a Viper, and the too much uſe of the more generous drinks, *viz.* Wine and Strong-waters, cauſes ſometimes the Jaundies. Moreover he endeavours to procure credit to this Hypotheſis, for that this diſeaſe is wont to be cured, not only by medicines opening obſtructions, but by them which blunt the force of a raging volatile ſalt (of which *ſort are the decoction of Hemp-ſeeds, alſo* Venice *ſoape*, with many other things of the ſame ſort.)

It belongs not to this place, neither is it to our purpoſe to deſcend to end this contention, nor dare I now raſhly determine it (ſince it hath tired ſo many Renowned Wits of the Moderns) whether really the choler be made in the bladder of the Gall, or whether it be only ſeparated from the blood in the Liver, the great organ of ſeparation; I confeſs this latter opinion beſt pleaſes me. And weighing theſe things ſeriouſly I am induced to think the cauſe of the Jaundies to conſiſt chiefly in this, that the choler being ſever'd in the Liver, is not, by reaſon of the ways being obſtructed, at all, or not enough conveyed to the bladder of the Gall, but that it muſt of neceſſity regurgitate into the maſs of blood; notwithſtanding in the mean while we deny not, but this affect may ſometime ariſe (although more rarely) from the Cyſtic paſſage or common pipe being obſtructed. But alſo we think the fault of the blood to proceed in part and perhaps ſometimes wholy for the morbific cauſe; when to wit from its ſulphurous and fixt Saline Particles above meaſure exalted, the choler is more plentifully, or quicklier generated in the maſs of blood, than can be ſeparated or diſcharged forth by the ordinary ways; wherefore this, ſeparating every where from the blood with the Serum, is affixed to the ſolid parts, and impreſſes its tincture upon them. And without doubt it is for this reaſon that ſome poiſons, and chiefly the biting of Vipers, and the dayly uſe of more generous drinks, induces the Jaundies in bodies before ſound, for whoſe cure ſometime Phlebotomie, and medicines reducing the blood to a right temper, are wont to profit more than thoſe opening obſtructions. Moreover it ſeems for this reaſon, that a tertian intermitting Feaver ſo frequently terminates in the Jaundies; for we may not ſuſpect the paſſages of the Liver can be by any means obſtructed, ſince in all fits, ſo great an agitation of the blood and humours, by cold, and heat, and ſuch an evacuation of them happens either by vomit or ſweat: and truly even as feaveriſh fits are cauſed, inasmuch as the ſulphurous part of the blood being too much advanced, in the firſt place perverts the nutritious juice into a morbific matter, and afterwards being inflam'd conſumes and exterminates it; ſo when the fixt ſalt is at laſt exalted together with the ſulphur in the blood, and for that cauſe meer choler is abundantly engendered, the feaveriſh enkindling of the blood ceaſes, by reaſon of the reſtrictive force of the fixt ſalt, and in place thereof the diſtemper of the Jaundies doth ſucceed. But as the blood being too much advanced to a ſulphureoſaline diſtemperature cauſes the Jaundies in any, though leaſt prediſpos'd to it; ſo in others very much diſpoſed thereto, having the ways of choler obſtructed and the ſulphur of the blood being too much depreſſed, it produces a freedom from that diſeaſe; for I have known many cachectick and phlegmatick perſons, to have been free from the Jaundies though they

The Authors opinion.

The cauſe of this diſeaſe ſometimes in the blood.

they have ſuffered under obſtructions and indurations of the Liver, as to moſt of its paſſages.

The cure of the Jaundies.

It is not worth our labour to make more ample diſquiſition about the Ætiologie of this diſeaſe; as to what reſpects the cure, there will be three primary indications, all which (for what may be the chiefeſt of them, and firſt to be exhibited, for the moſt part is concealed) we ſhall proſecute together; wherefore the intentions of healing ſhall be, 1. That the obſtructions of the paſſages or choler-bearing veſſels be opened, if perhaps any ſhall be either in the *porus bilarius*, in the Cyſtic paſſage, or in any place about the Liver. 2. That the blood be reduced to its due temperament and mixture, leſt it ingender choler above meaſure, or render it unapt to be voided. 3. That the ſtrength may be ſuſtain'd, and the ſymptomes chiefly hurting them may be withſtood.

The 1. Indication.

1. That we may ſatisfie the firſt indication, Cathartic evacuations notably conduce, as well by Vomit, as ſiege, whereby the choler's deſcending towards the inteſtines may be furthered, and veſſels obſtructed, by the great ſhaking of them, freed from their obſtruction. 2. Sharp, bitter, ſalt Medicines and others indued with a certain briskneſs ought alſo to be given, which provoke the motion of choler gathered in the Liver, and ſtagnating; hither alſo ought to be referred, what by ſimilitude of ſubſtance, and as it were ſignature, in as much as they are indued with a yellow juice, have the report to help againſt the Jaundies; notwithſtanding many of theſe may fitly be numbred under the ſame claſſis of evacuators, as the former, becauſe they move Urine or Sweat.

The 2. Indication.

The ſecond indication altogether requires alteratives, *viz.* Medicines which may depreſs the exaltations, or ragings of the Sulphur and fixt ſalt, and in the mean time provoke the reſtitution of the volatile ſalt depreſſed; for theſe ends remedies endued with an acid or volatile ſalt, beſides chalybeats do principally bring help; from hence ſpirit of ſalt, of vitriol, juice of Lemons, alſo ſpirit of Harts-horn, alſo dung of Sheep and Geeſe, *Crocus Martis* and divers other preparations thereof, are frequently uſed with ſucceſs in the Jaundies.

The 3. Indication.

The third indication vital ſuggeſts more and ſundry intentions of cure, procuring the ſtrength to be reſtored, and the removing the ſymptomes whereby it is prejudiced, all or the chief particularly to enumerate, and preſcribe would be a vaſt and tedious work; wherefore we will annex only certain general rules about diet, and ſome Cordials and Anodynes appropriate in this condition.

Forms of Remedies.

The curatory indications being appointed after this manner, it next lies upon us to accommodate the moſt ſelect Medicines, *viz.* as well the ſimple as the compound, to theſe now propoſed intentions of curing, and to unfold the manner and reaſon of the Operating of remedies which are accounted of ſpecial note in this diſeaſe. Therefore firſt we propound the forms of evacuating Medicines appropriate in the Jaundies.

1. *Vomits.*

Vomits.

Vomiting Medicines are frequently wont to help in the recent Jaundies, while the tone and ſtrength of the bowels are firm; in as much as they alleviate the ſtomach always oppreſſed in this diſeaſe with an unprofitable burden of viſcous Phlegm; and moreover do free their infarctions by irritating the *vaſa choledocha*, and by much ſhaking all the paſſages of the Liver, and make eaſie the paſſage of the choler by the former accuſtomed ways.

Take of the infuſion of Crocus Metallorum from half an ounce to ſix drams, Wine of Squils an ounce, Oxymel ſimple half an ounce, make a Vomit to be taken with Government.

Sometimes it is convenient to exhibit, the evening before, the following preparatory Medicine for the eaſier Vomiting.

Take of the Powder of Aſarum roots, facula Aronis of each a ſcruple, of Tartar vitriolated half a ſcruple, of Oxymel of Squils an ounce, mix them.

Take of Sulphur of Antimony ſeven grains, Scammony ſulphurated eight grains, cream of Tartar half a ſcruple, make a Powder, give it in a ſpoonful of Panada.

Take nine Aſarabacca leaves, cut and bruiſed put them into three ounces of White-wine, preſs out the liquor, let it be taken in the morning with regiment.

Take of Gambugia prepared eight grains, Tartar vitriolated ſeven grains, make a Powder.

PHAR. Part. II.

2. *Cathartick.*

Purgers. Purgers take place in this diſeaſe, be it recent or inveterate, *viz.* that as well a more plentiful ſtore of Excrements may be now and then withdrawn from the firſt paſſages, as that the *vaſa choledocha* may be excited to Excretions.

A Bolus. *Take of Electuary of juice of Roſes three drams, Rhubarb a dram, Salt of Wormwood, Cream of Tartar, of each half a Scruple, Syrup of Rhubarb, make a Bolus.*

Apozems. *Take of the roots of ſharp-pointed Dock prepared one ounce, the tops of Roman Wormwood, of Centaury the leſs, of each P. ij. Gentian and Turmerick roots an. two drams, yellow Saunders one dram, boyl them in a Pint and a half of Spring-water to a Pint, adding towards the end Senna ſix drams, the beſt Rhubarb three drams, Agarick a dram and half, Coriander-ſeeds two drams, White-wine two ounces, let them boyl cloſe two hours, after ſtrain it and clarifie it by ſettling; the Doſe from four ounces to ſix, with one ounce of Syrup of Rhubarb, the water of Earth-worms three drams; make a Potion to be repeated every or every other day, for three or four dayes.*

In a weaker Conſtitution.

A Potion. *Take of choice Rhubarb two drams, Agarick trochiſcated, half a dram, Cinnamon half a ſcruple, Ginger half a ſcruple, make an infuſion in White-wine and Chichory-water, of each three ounces, for three hours, in it ſtrained diſſolve one ounce of Syrup of Rhubarb, water of Earth-worms two drams. Or Rhubarb from half a dram to a whole one, Salt of Wormwood a ſcruple, make a Powder.*

Pills. *Take pil. Ruffi a ſcruple, Extr. Rudii half a ſcruple, make 4 Pills, take them in a morning with government, after 4 or 5 dayes repeat them.*

Deoppilative Medicines. In the third place follow Deoppilatives, which are alſo Diureticks, or Diaphoreticks, ſome whereof are accounted ſpecifick, by reaſon of ſimilitude of ſubſtance; Medicines of this ſort, both promote the ſeparation of choler from the blood, and urge the paſſages of it, being ſeparated, through the paſſages and pores in the Liver open but little. Moreover, in the mean time, by diſſolving the blood, they carry off the ſeroſities and cholerick recrements thereof, ſometimes by Sweats and Urine.

Elixir. *Take of Elixir Proprietatis one ounce, take 20 drops in the morning, and at Five in the afternoon, with a convenient vehicle: after the ſame manner are taken, Tincture of Antimony, or of Salt of Tartar, and the ſimple mixture in a greater Doſe: for vehicles, Apozemes, diſtilled Waters, and Juleps for this Intention of curing are convenient.*

Apozems. *Take of the roots of Celandine the greater, ſtinging Nettles, Madder, of each one ounce, tops of Roman Wormwood, white Horehound, Agrimony, Germander, of each one handful, Worm-ſeeds two drams, Shavings of Ivory and Harts-horn, of each two drams, yellow Sanders a dram and a half, Coriander-ſeeds two drams, boyl them in three pound of Spring-water to two pound, adding of White-wine four ounces, ſtrain it; and add Syrup of Chichory with Rhubarb two ounces, water of Earth-worms, an ounce and a half, make an Apozeme, the Doſe four or ſix ounces twice in a day.*

Take of white Horehound dryed, Centaury, of each one handful, Gentian and Turmerick-roots, of each three drams, Cinnamon one dram, Saffron half a dram, being ſliced put them into a Glaſs with two pound of White-wine or Rheniſh-wine; make an infuſion, the doſe three ounces

To this we will add *Geſners* famous Antictericum.

Take of the roots of ſtinging Nettles a pound, Saffron one ſcruple, bruiſe them well, and draw off the Tincture with White-wine, the doſe three ounces 4 or 5 dayes.

Empirick Remedies. Like to the former is that of *Fr. Joel. Take the Roots of Celandine the greater two handfuls, Juniper-berries a handful, bruiſe them and pour on them a pound of Rheniſh-wine, and draw out the juice, the doſe four ounces twice a day.*

The juice of White Hore-hound is mightily commended by Diaſcorides, *and the Syrup of the ſame by* Foreſtus, *for curing the yellow Jaundice.*

In lieu of an Elixir, and other Chymical liquors, which to avoid nauſeouſneſs are to be taken in very ſmall quantity; to others endued with a ſtronger Conſtitution, Electuaries, Powder and Pills may be adminiſtred with better ſucceſs.

Take

PHAR. Part. II.

An Electuary.

Take of Conserve of Roman Wormwood, of the yellow Rinds of Oranges and Limons, of each two ounces, Species Diacurcumæ one dram and half, powder of Ivory, yellow Saunders, of Lignum-Aloes, of each half a dram, Troches of Capers one dram, of Rhubarb half a dram, Salt of Wormwood two drams, with Syrup of Chichory with Rhubarb make an Electuary, the dose the quantity of a Chesnut twice aday, drinking after it three ounces of the following Julep.

Distilled Waters.

Take of the greater Celandine-water, Fumitory, Wormwood, Elder-flowers of each five ounces, Snail-water, water of Earth-worms, compound, of each two ounces, Sugar half an ounce, mingle them and make a Julep. Or,

Take of the roots of stinging Nettles, Angelica, Gentian, of each four ounces, the greater Celandine leaves and roots, six handfuls, Wormwood, Tansie, Southern-wood of each four handfuls, the outer rinds of twelve Oranges and four Limons, prepared Worms and Snails of each one pound, Cloves bruised two ounces, being all cut and bruised pour upon them eight pound of White-wine, let them be distill'd in a cold Still, and the whole water mixt. Or,

Take of filings of Steel one pound, fresh Strawberries six pound, put them into a glazed pot, stirring them together, and let them stand aday, afterwards add of English Rhubarb sliced one pound, the rinds of four Oranges sliced, pour upon them of White-wine six pound, and distil them according to Art; let all the liquor be mixt together. The dose of this and of the former is three ounces twice in a day after the Electuary or any other Medicine.

Take of Turmerick-roots, Rhubarb, of each one dram and a half, the Bark of Caper-roots, of Asarum-roots, of each half a dram, Extract of Gentian, and Centaury, of each one dram and a half, Salt of Wormwood four scruples, Water-cress-seeds, half a dram, of Rocket half a scruple, Elixir Proprietatis one dram, gum Ammoniacum dissolved in the water of Earth-worms what will suffice to make a mass, form it into small Pills, the dose is half a dram evening and morning, drinking after it three ounces of the distilled water.

Sylvius *his Empyrical Remedies.*

Sylvius doth much magnifie for cure of the Jaundies, the Decoction of Hemp-seed in milk, and the solution of Sope, and from thence endeavours to establish his own Hypothesis (as we have above intimated) whereby he endeavours to deduce the Ætiologie of the Jaundies, rather from an alienation of the choler, than from the obstruction of its passages.

The second Indication.

2. The Second Indication respecting the altering or tempering of the blood, by which it may breed but moderately, and duly separate the choler, requires Medicines of that sort, which depress the Sulphur and fixt Salt too much advanced. For these ends, I know not by what chance or conduct Medicines endowed with a volatile Salt, as Worms, Snails, Millepedes, yea Lice, Dungs of fourfooted Beasts, and Fowl, are brought into practice for curing the Jaundies, and not only prescribed by Empiricks, but the more famous Physicians: These sometimes by themselves, but oft'ner joyn'd with Purgers and Deoppilatives, become the chief Ingredients in Compositions against the Jaundies.

Remedies against the Jaundies endowed with an animal volatile Salt.

Fonseca prescribes Goose-dung gathered in the Spring-time and dryed, as also the white excrement of Pullets, of both which let the powder be given in a convenient vehicle from half a dram to a whole one.

Various forms of them.

Take powder of Earth-worms prepared, of Goose-dung, of each three drams, Ivory, yellow Sanders, of each half a dram, Saffron one scruple, make a Powder, divide it into six parts. One to be taken every morning with some appropriate liquor. To the Apozeme, or Anticterical Tincture prescribed above, Earth-worms, Goose-dung, *and also* Sheeps-dung *are profitably added.*

Take Millepedes fresh and alive from 50 to 100, Saffron half a scruple, Nutmeg a scruple, bruise them together, and infuse them in Water of Celandine four ounces, of Earth-worms two ounces, express them strongly, and drink it: after this manner take it first once, then twice in a day for a Week.

The vulgar and Emperical remedy with us is, that Nine quick Lice be taken in a morning for five or six dayes, by which remedy they report to me many to be cured (whenas other remedies effected little) which truly can help by no other means than by restoring the volatile Salt depressed in the blood.

Also such as are endued with a mineral volatile Salt.

Upon the same account of succour even in this disease the flowers of Sal Armoniac, the volatile Salts of Amber, Harts-horn, Soot, in like manner their Spirits are frequently administred with great success.

Take

PHAR. Part. II.

Take powder of Earth-worms prepared two drams, Species Diacurcumæ one dram, flower of Sal Armoniac half a dram, Salt of Amber a ſcruple, Extract of Gentian one dram, Saffron one ſcruple, Gum Ammoniacum diſſolved in water of Earth-worms what ſuffices, make a maſs, and form it into ſmall Pills; the Doſe is three or four, morning and evening, drinking after it three ounces of the Julep before preſcribed.

Take Spirit of Harts-horn tinctured with Saffron three drams; Doſe from 15 drops to 20. with the diſtilled water preſcribed above.

Steel remedies of ſeveral kinds.

In this Claſs of Medicines by which the icterical diſtempers of the blood are to be corrected, ſteel'd remedies do alſo challenge their place by right; for theſe afford notable help, not ſo much by unlocking the obſtructions of the bowels, as by depreſſing the rage of the Sulphur, and fixt Salt, and by volatilizing the blood, in the Jaundies, no leſs than in other cachectical diſtempers.

Wherefore, to the Decoction, or Tincture, or Infuſion above preſcribed, is properly added the filings of Iron, or the prepared powder thereof (its mineral conſiſtence being ſome ways opened) or the vitriolic Salt extracted; from hence it is, that Medicinal waters heal even to a miracle thoſe ſick of the Jaundies, that had been deſpaired of; although theſe drunk in a very large quantity, inaſmuch as they paſs through all the veſſels, do alſo open the paſſages of the Liver, however ſhut up.

Therefore alſo even Preparations of Steel are added to the Electuary, Pills and Powders above recited, one while this, another while that, in due proportion. Moreover the Syrup thereof given twice aday to one ſpoonful, in three ounces of Apozeme or water againſt the Jaundies; alſo tincture of Steel to twelve or fifteen drops may be adminiſtred in the ſame manner.

Outward and Sympathetick remedies againſt the Jaundies.

In the laſt place we may annex to this Claſſis of altering Medicines thoſe things which not taken inwardly, but outwardly applyed, and by contact, uſed to the very urine of the Patient are held to cure this diſeaſe.

As to the former, a remedy often tryed by the vulgar, is a living Tench-fiſh, whoſe ſcales and outer ſuperficies do reſemble a yellow colour, applyed to the right Hypochondria, or Stomach according to ſome, (to the ſoles of the feet, according to others) whence a ſudden flight of this diſeaſe is expected; hence although many promiſe themſelves a ſure cure, it hath often deceived me.

Another cure of the Jaundies at a diſtance is ſaid to be done by I know not what ſympathy or ſecret manner of working.

Take the freſh Urine of the Patient made at one time, of the Aſhes of the Aſh-tree ſearced, as much as ſuffices to reduce into Paſte, which may be formed into three equal balls, to be placed in a place ſhut, near the Hearth or Stove; as theſe dry and harden, the Jaundies will vaniſh; after this courſe, I have known this inveterate diſeaſe happily cured, although reſiſting many other remedies; the practice thereof is very familiar with the Vulgar.

The reaſons of ſome of them.

If of a certain it could be made manifeſt that this effect doth for the moſt part happen, and the reaſon of it be inquired into; in the firſt place we ought to ſuppoſe a conſent or ſympathy of the ſpirits and other particles in the animated blood, with other ſymbols inmates of the freſh Urine; and that they are immediately affected in the like manner with theſe. Notwithſtanding it is evident enough that a lixivial Salt mingled with Urine, doth preſently ſet free the volatile ſalt formerly ſubdued or enwrapt in other particles; as is plainly ſeen in diſtillation of Urine, which if you urge by it ſelf with a ſand-heat, nothing but Phlegm will ariſe; but add the calx of Tartar, or Aſhes, immediately the Spirit and volatile Salt will come forth: wherefore, that Empirical adminiſtration being adminiſtred, at the ſame time, both in the Icterical Urine, and alſo in the blood of the Patient, the volatile Salt eſcapes out of the power of the fixt Salt and the Sulphur, and for that cauſe the Icterical diſtemper of the Blood is put to flight. Alſo upon the ſame reaſon is built another ſympathetical cure of the Jaundies, whereof *Phil. Grulingius*, and *Felix Platerus* do make mention, *viz.* the ſick party piſſing upon Horſe-dung while it is hot, hath cured many of the Jaundies; inaſmuch as the fixt Salt of the Urine, and thereby the fixt Salt of the icterical blood of the Patient, is altered by the volatile Salt of the freſh dung, and reduced into its due temperature.

The third Indication vital.

3. The third Curatory indication vital inſtitutes a convenient courſe of Diet, and moreover Cordials and Anodynes, of both which there is frequent need.

As to what relates to the former, Food in this diſeaſe, more than in any other ought to be medicinal. For Vegetables and their parts, ſtyled commonly Hepatick remedies, are boyled in the broths of theſe Patients. And theſe alſo are wont to be made inſtead of other fleſh, of Worms, or Snails, (which are accounted Antidotes againſt it

the Jaundies.) Moreover Ale, and other ordinary drinks are impregnated with infusion of Medicaments. PHAR. Part. II.

Take of the roots of Stinging Nettles, of Strawberries, of each an ounce and half, Eringo-roots candied one ounce, Ivory and Harts-horn, of each two drams, Earthworms cleansed twenty, a Crust of White-bread, Mace two drams, boyled in two pound of water to one pound, strain it through Hippocrates *sleeve, to which add Diasantalon half a dram, make breath, whereof take from four ounces to six, twice in a day: for ordinary drink, fill a Tub of four Gallons with Beer, after it hath wrought, put in the following Bag.*

Take the tops of Roman Wormwood, white Horehound dryed, of each two handfuls, the roots of sharp pointed Docks six ounces, of the Bark of Ash, of Barberries, of each 3 ounces, the outer Rinds of eight Oranges, and four Limons, being sliced and bruised, let them be prepared according to Art.

Since many sick of the Jaundies are usually affected with a great languishing, and frequent faintings of the Spirits, they have also need of cordial Remedies.

Take of small Aqua Mirabilis eight ounces, water of Earth-worms four ounces, Syrup of Orange-peels two ounces, mingle them, the dose two or three ounces.

Forms of cordials.

Moreover, they who are troubled with this disease, do very much suffer with pain sometimes very troublesome in the night, and are often obnoxious to waking; wherefore also Anodynes come into use for administration.

Take of Aqua Mirabilis, water of Earth-worms, of each one ounce, Diacodium six drams, Tincture of Saffron half an ounce, the dose one or two spoonfuls late at night, if sleep be wanting.

Take of Laudanum tartarizated two drams, Aqua Mirabilis two ounces, Syrup of Clove-gilly-flowers one ounce, mix them, the dose is one spoonful after the same manner.

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Of other Hepatick Remedies.

THe Liver is seldome or never found obnoxious to an Atrophie or extenuation; since truly it performs the office of a strainer, and according to some, of a mingling bowel; but on the contrary by reason of many causes and occasions it runs the hazard of being encreased as to its bulk, and to be stufft and swell'd with divers things gathered therein, and with concretions. Hence no small account of health consists in this, that the Liver having right conformation may freely convey the blood every where, without keeping back too much Custome or provision for it self.

The Kinds of Remedies assigned to the Liver.

Truly many faults, and indeed not altogether undeservedly, are imputed to this Bowel, as also unto the Spleen; the chief Kinds of which we shall touch upon. The Liver frequently and chiefly is wont to be faulty in one of these two, *viz.* First that intercepting the nutritious juice appointed for other parts, it bestows it to its own proper use; this is plainly discerned in Children affected with the Rickets, and moreover in many others that lead a sloathful and idle life. Anciently there was an art with the *Romans* so to feed a Goose that the Liver prodigiously encreased might weigh more than the whole body. Secondly, the other fault of the Liver is, that it too easily receives all the excrements and feculencies whatsoever of the depraved Blood, brought into its inward recess, and by retaining them there, doth not only grow large, but is obstructed in its passages, whence frequently comes the Jaundies, or a Dropsie; it contracts also tumours and preternatural Concretions of divers kinds of matter.

Two general intentions of curing this bowel.

Many and divers distempers of the Liver ought to be referred to these two heads: of each of which it is not our purpose to institute particular pathologies. As to what appertains to the general pharmacie of this bowel, there will be one principal scope of curing, that its income be diminished as much as may be, or altogether cut off.

Wherefore

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Wherefore it will behove us to procure theſe two things, *viz.* That the Liver augment not above meaſure, by taking the nutritious juice too much unto it ſelf; and that it retain not the feculencies of the Blood, whereby it may be affected with obſtructions and preternatural Tumours.

It will be much eaſier to prevent than cure either of theſe faults of this bowel. For truly the former may be done, reſpect being had only that the blood be well conſtituted in its Temperament, and enjoying a free Circulation, it may both diſpenſe its nutritious juice to the parts, and eſpecially its outward parts, and driving forth all its excrements to the particular Emiſſaries, it may put them away there. And ſurely, the Medicines vulgarly called Hepaticks, do firſt and more immediately exert their power by purging the blood, rather than by correcting of the Liver: thoſe namely conſiſt of particles of ſuch a kind, which entering into the blood, and not mixing with it, do ſo ſtir up the maſs thereof, and break it into pieces, that all the Coagulations and Concretions being taken away, all its dregs and impurities may eaſily depart, and being carried to their proper Emunctories may be caſt out of doors.

Medicines vulgarly called Splanchnick, firſt and chiefly operate upon the blood.

For truly all remedies which are called Splanchnick, firſt work upon the blood, and incite its conſtitutive parts into a kind of effervelcency, and ſo toſs, divide, and move them rapidly to and fro, that the vaporous effluviums being ſent into the habit of the body, the ſerous excrements into the Kidneys, the cholerick into the Liver, the melancholy into the Spleen, and others to other Emiſſaries for which they are fitted, may be ſhut out, without impediment or adheſion.

What ſuch they are which more eſpecially reſpect the Liver.

Wherefore the ſame Remedies which help the Liver, help alſo the Spleen, the Reins, the Lungs, and other the Bowels in their ſeparations; and for the moſt part move ſweating and urine. If any be found to reſpect one part before the reſt by any ſpecifick power, it is therefore becauſe their particles being more ally'd unto the excrements to be ſeparated within that bowel, and from thence aſſociated to them are conveyed thither together with them. For this reaſon Rhubarb, Turmerick, the greater Celandine, with many others adjoyned to the bilious humour, do the more eaſily reach the paſſages of the Gall, and are wont to ſuccour in the Jaundies. We have obſerved before, the energies and manners of operating of Medicines of this kind. As to what appertains to the other, vulgarly called Hepaticks, firſt we will annex briefly certain forms of thoſe which are reported either to prevent or remove the unnatural augmentation of the Liver, and then thoſe which are held to provide againſt or take away the obſtruction and preternatural Tumours thereof.

1. Againſt the too much encreaſe, or improportionate nutriment of the Liver, firſt a more ſparing and thin diet, ſhort ſleeps, and moderate and frequent exerciſes are convenient: wherefore we preſcribe for Infants, and Children, when they are diſcovered obnoxious to this diſtemper, as in the Rickets, that they ſuck thin and ſerous milk, that they be ſhaken or toſſed in their Nurſes arms, and tumbled quickly to and fro, or be carried ſwiftly in a Chair or Coach, and as ſoon as may be, learned to go and to uſe their feet.

Some form of Hepaticks.

Take of the water of Snails, of Earth-worms, of each three ounces, Syrup of Chicory with Rhubarb two ounces, ſpirit of Sal Armoniac with Gum Ammoniacum one ſcruple, mix them, and take a ſpoonful evening and firſt in the morning.

Take of the roots of Maleferne, Chervil, candied Eringoes, of each one ounce, the leaves of Agrimony, Harts-tongue, male Speed-wel, of each one handful, Shavings of Ivory, Harts-horn, of each two drams, white and yellow Sanders, of each one dram, Raiſins ſtoned one ounce and a half, Barly three drams, boyl them in three pound of Spring-water to two, to it ſtrained add of Snail and Earth-worm water, of each one ounce and half, Syrup of Chicory two ounces, make an Apozeme, take two or three ounces in a day.

Take powder of white and yellow Sanders, Crabs-eyes, Lignum-Aloes, of each half a dram, Salt of Wormwood one Scruple, make a powder, the doſe half a Scruple to a whole one twice a day.

Take Empl. Diaſaponis, Cerate of Sanders, of each what will ſuffice, make a Plaiſter to be applyed to the Hypochondrion.

Take Unguentum Splanchnicum two ounces, Oyl of Wormwood one ounce, mix them, and make a Liniment for the region of the Liver.

Hither many other methodical as well as Empirical Medicines being uſed for the Rickets may be referred, but we haſten to other things.

Their numbers enumerated.

2. Remedies ordained for moſt other diſtempers of the Liver are either ſimple or compound. Very many of the former ſort are reckoned by Authors, as if they were procreated for this particular uſe. *Heurnius* ſays, *That God Almighty hath offered to*

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the World the greater plenty of Remedies of this kind, by reason of their notable necessity. And to this Rank may be referred in the first place all kinds of Chichories, the Sorrels, the sharp pointed-Docks, and almost all Vegetables endowed with bitterness and something of sharpness, (wherein the deoppilative vertue is reported to consist) as Wormwood, Germander, Ground-pine, Fumitory, Tanzy, Agrimony, Liverwort, Lignum Aloes, all the Sanders, Tamarisk-bark, and Ash-bark, the roots of Capers, with many others, which commonly make up the greatest part of Herbals; so that whilst the Liver like a certain Goddess ruled sanguification, very many Medicines were used to be ascribed for its safeguard and succour.

The fixt Salts of herbs, the acid Spirits of Minerals drawn by distillation, belong by right to this number, as they do chiefly exagitate the mass of blood, dissolve the Concretions thereof, dispatch their obstructions, and cause it every where to be passable, as to all the parts thereof.

Chalybeates.

If I here omit Chalybeats, most Chymists will censure me very unjust to the Liver; for truly as the Prerogative of *Venus* is vulgarly attributed to this bowel, so as to constrain to Love, we may hence expect that *Mars* will be perpetually kind unto it. And really it is manifest by Reason, as well as Experience, that Preparations of Steel are convenient in hepatical affects, as chiefly in the Jaundies, and oftner in the Dropsie; wherefore these are put into the Receipts of the Ancients and Modern, and among curatory Compositions. For what reason the Preparations of Steel, as in like manner the medicinal waters from Iron, as well natural as artificial, do purifie the mass of blood, and by consequence do relieve many distempers commonly call'd Hepatical, is shewn by us largely enough in another place, so that here is no need for repetition.

Medicines that are appointed by Physicians for the Liver are divided into various forms, but first into hot and cold, and also into moist and dry; accordingly as the temper of this bowel is supposed to consist after divers manners, when in truth it is only a dyscrasie of the blood, which being so diversly faulty, desires so various an energy of medicines. Neither is it a less vulgar error, that in the estimating of mens constitutions, the various temperament of every one due to the blood, is ascribed chiefly to the Liver, as hot or cold, or otherwise disposed.

The Shop compositions of Hepaticks.

In the Antidotaries of the Antients there are many Shop-compositions extant, which seem to be designed for the Livers sake only, of which sort are *Rhasis* his Electuarie of the dross of Iron, *Crocus ferri* of *Balchusis*, which being mixt with Treacle is commended for hepatical affects; the *species Diatrion santalon*, *Diarrhodon Abbatis*, *Trochisc* of *Rhubarb*, *of Agrimony*, *of Capers*, *Diacurcuma*, *Dialacca*, *Syrup of Wormwood*, *Chicorie*, *of the five roots*, *Byzantinus*, with many others, unto all whose forms, a vast Catalogue is annext for curing all the diseases of the Liver. But these passed over, it pleases me now to propound some Kinds and Examples of Medicines which are counted deoppilative according to the practice of the Moderns.

Therefore for an opening Decoction,

Magistral Compositions.

Take of the roots of Ferne, Chervil, stinging Nettles, Dandelyon, of each one ounce, the leaves of Agrimony, Harts-tongue, Speed-well, Oak of Jerusalem, *Liver-wort, of each a handfull, white and yellow Sanders, of each three drams, Ivory half an ounce, red Cicers an ounce, Coriander-seeds three drams, Raisins two ounces, boyl them in four pound of water to two pound, adding towards the end White-wine four ounces, strain it through* Hippocrates *Sleeve, to which add Species Diarrhodon Abbatis one dram, of our prepared Steel two drams, Syrup of Chicory with Rhubarb owo ounces, the Water of Snails and Earth-worms, of each one ounce, the dose six ounces twice in a day after a dose of the following Electuary.*

Electuary.

Take of Conserve of the yellow of Oranges and Limons, of each two ounces, of Wormwood and Fumitory, of each one ounce, simple Powder of Aron-roots, yellow Sanders, Lignum Aloes, of Caper-roots of each one dram and a half, Crabs-eyes one dram, Salt of Wormwood two drams, Syrup of Fumitory what suffices, make an Electuary, the dose the quantity of a Walnut twice in a day, drink after it a draught of the Apozeme now prescribed, or of the following distilled water.

A distill'd Water.

Take the leaves of Wormwood, Centaury, Tansie, both sorts of Southern-wood, Tamariske, of each four handfuls, of green Walnuts four pound, of Ashen keyes green two pound, the Rinds of ten Oranges and four Limons, Snails and Earth-worms prepared, of each one pound, all being sliced, pour on them of White-wine eight pound, distill it in a cold Still, let all the liquor be mixt together, the dose three ounces, sweetning it with Sugar or a fit Syrup.

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Pills.

If a form of Pills will pleaſe better, the enſuing Extract called in the Shops *Extractum Ecphracticum*, ſeems profitable.

Take of white and clear Tartar, and of freſh Filings of Iron, of each 4 ounces, let them be ground together into powder, after boyl them in Fountain-water from four pound to two (ſome uſe White-wine) to the ſtrained liquor add the tops of Centaury, of Roman Wormwood, of Carduus, of each one handful, Gentian-root half an ounce, Species Diacurcumæ an ounce and half, let them boyl ſhut cloſe for three or four hours, ſtrain it, and evaporate by the heat of a Bath to the conſiſtence of Pills, adding roots of Rhubarb or Species of Hiera Picra *two drams; the doſe is from one ſcruple to half a dram made into Pills, in the evening, with an appropriate vehicle.*

For the ſame intention, *viz.* to prevent or to remove the obſtructions of the Liver, a medicated purging Ale, to be taken many dayes in Spring and Autumn, is by ſome very much magnified, and exactly obſerved every year during their lives.

Take of the roots of ſharp-pointed Docks prepared, Polypodie of the Oak, of each 3 ounces, Madder-roots two ounces, Engliſh Rhubarb two ounces, of leaves of Senna four ounces, Epithymum two ounces, yellow Sanders one ounce, Carthamus and Coriander-ſeeds, of each one ounce and a half, ſlice them and bruiſe them according to Art, make a bag for 4 gallons of Ale, after ſix dayes let him take to 12 ounces more or leſs in the morning, expecting four or five Stools without regiment.

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Of Remedies for the Dropſie called Aſcites.

After the Jaundies and the Remedies thereof, our method leads us to treat of a Dropſie; not becauſe of the Vulgar opinion, that it always ariſes from the fault of the ſame bowel; but becauſe that former diſeaſe having long continued, for the moſt part concludes in this: which happens ſo, not ſo much from the fault of the Liver, as from the whole Blood, for this and not that perform ſanguification, Wherefore, when the maſſe hereof hath for a long time been filled with cholerick excrements, and at length degenerating from its temper, accumulates alſo watery humours, then doth a Dropſical Diſpoſition come upon the Jaundies.

The more remote cauſes of an Aſcites.

But whereas three ſorts of Dropſies are vulgarly ſuppoſed, viz. *Aſcites*, *Tympanites*, and *Anaſarca*, we will at preſent handle only the two former, appertaining to the Splanchnick or Pathologie of the nether Belly. And firſt what relates to an Aſcites,

Firſt in reſpect of blood.

this diſeaſe as to its matter and formal reaſon is manifeſtly known by the ſign of even many ſenſes together, *viz.* it is a Tumour of the Abdomen, from a wateriſh tumour contained within the cavity thereof. The water making this tumour, ſometimes encreaſes to a huge inundation, and ſcarce credible quantity. I have once ſeen a Tub would hold 15 gallons filled with water taken out of the Abdomen of a woman dead of a Dropſie. But whence that humour proceeds, alſo by what manner, and from what cauſes it gathers together in the belly firſt, and afterwards is ſenſibly augmented; and laſtly by what paſſages, and by what vertue and operations of Hydragogue Remedies, it may again be taken from thence, and evacuated, ſeems moſt difficult to be unfolded.

It doth not always proceed from the Liver and Spleen.

As to the former, *viz.* the encreaſe of water, ſome have thought it to deſcend from the Liver, and others from the Spleen diſtempered, into the cavity of the Abdomen; and ſo this bowel, or that being vitiated, always to be the cauſe of an Aſcites. But that this is otherwiſe, Anatomies of many dead of this diſeaſe, do manifeſtly declare: when after the inundation of the belly, the Liver and Spleen are found often without fault. And truly theſe bowels do not ſeem the Springs of any ſuch illuvies, being endowed with no cavityes, wherein waters might be accumulated together: wherefore the origine of an Aſcites, as of a ſtanding Pool or Lake, is to be derived from a River, or at leaſt a glutt or inundation of ſome Humour.

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The humours by which it is produced are,

The humours that flow within the paſſages, or Veſſels as Brooks, are chiefly theſe three, *viz*, the Blood, the milkie Humour, and the Lympha. The ſhowering or diſtilling of water may come to paſs from the nervous Liquor which ſometimes ſlowly and inſenſibly ſweats out of the Fibres and Membranes, and from vapours condenſed within the hollowneſs, or ſome Cavity of the Body. Whether by theſe ways an Aſcites doth rather, and oftener proceed, we will now ſearch.

Firſt the Blood.

And in the firſt place as to what relates to the blood, it is without doubt, the Serum falling from the maſs thereof, too much diſſolved, as it doth excite Fluxions and Catarrhs of various kinds, ſo it ſometimes ſtirs up the greater illuvies of waters, *viz.* Dropſical: wherefore when an Anaſarca proceeds altogether from this cauſe, and when oftentimes an Aſcites comes upon that diſeaſe not immediately healed, we may well enough inferr that either diſtemper is induced from a watery humour, every where poured out from the little mouths of the Arteries. Moreover, it is not much improbable, that the Serum of the diſſolved Blood is firſt and ſolitarily poured out of ſome end of the Cœliac and Meſenteric Arterie being open into the Cavity of the Abdomen, and ſo brings on an Aſcites without an Anaſarca going before; and ſo eſpecially if perhaps it happen, that ſchirrhous Tumours, Ganglion's, little ſwellings, or preternatural Concretions of another manner, are firſt raiſed about the Meſentery, the Spleen, the Liver, the Womb, or any of the other bowels of the nether belly: for, becauſe the Circulation of the blood is hindred in thoſe places, that the blood being carryed through the arteries, may be ſome way brought back, the ſerous part being thruſt out from its company, falls into the cavity. For truly it is moſt evidently manifeſted, that it ſo comes to paſs, by this Experiment mentioned by us in another place, *viz.* If in a living animal, the jugular veins being taken up and bound with a thred, the reduction of the blood be ſtopt, the whole Region of the head ſwells in a ſhort ſpace, with a water between the skin, and clearly hydropical. And truly I have more frequently obſerved that an Aſcites hath followed upon ſecret tumours gathered and raiſed in ſome places in the lower belly: which certainly happens for the reaſon above recited. When the courſe of blood being obſtructed, the watery part is extravaſated in a ſhort ſpace, that humour is not meerly ſerous, but beſides, the nutritious Liquor, ordained to nouriſh all the ſolid parts, is emptyed into the belly: wherefore, while this Region ſwells up, the members are extenuated, and the Lympha taken out from an Aſcites, with heat thickens and grows white, like the white of an Egg.

2, & 3. The milkie and watery humour.

It is alſo very probable, that the milkie Veſſels being burſt aſunder, pour out their humour into the cavity of the abdomen. Truly the moſt renowned *Sylvius* thought this diſeaſe moſt frequently engendered from ſuch a cauſe. And truly as out of the milkie or watery Veſſels, *viz.* one of them or both together, being divided or opened, we may well ſuſpect the illuvies of water or chyle ſometimes to overflow the bowels of the nether belly; ſo the following obſervation ſeems to confirm the ſame thing. Of late one that had been long ſick of the Jaundies, and in the mean time temperate and abſtemious of drink (to which he was not prompted by thirſt) contracted an Aſcites, increaſed in a ſhort time hugely. After that Medicines were adminiſtred in vain, a Paracenteſis is attempted according to the manner of *Sylvius*, with a hollow Needle; out of the orifice, not icterical water, but lympid and thin flowed out abundantly; from whence we may inferr, that Hydropic humour flowed not out of the maſs of blood, for then it had been coloured, but diſtill'd out of the lymphic or milkie veſſels into the cavity of the abdomen. We have join'd together as akin the ways of the milkie and lymphic Veſſels in propagating an Aſcites, becauſe both veſſels do convey the chyle, or what is analogous to it, to the common Receptacle; and many branches or leading Pipes of either kind, are diſtributed about the bowels of the nether belly; in the mean time, it is not improbable but that a ſolitary fault of either veſſel may ſometimes produce an Aſcites.

As to the other ways of generating an Aſcites, propoſed in the beginning, I am ſcarce induced to think, ſuch an inundation of the belly can eaſily ariſe from the diſtilling of a nervous humour, or by reaſon of vapours there condenſed: although perhaps in a Tympany where the cavity of the abdomen is enlarged, and tranſpiration hindred, the effluvia that were wont to exhale, being forced inwards, are changed into Lympha or water, wherefore for the moſt part an Aſcites is ever conjoyn'd with that diſeaſe.

An Aſcites often the product of the Jaundies.

The immediate or conjunct cauſes of an Aſcites being deſign'd after this manner, which indeed ſeem to be, either a watery humour poured out of the Veſſels bringing Blood, or Lympha or Chyle poured out of the proper paſſages of them both; now we muſt in the next place inquire about the more remote cauſes of this diſeaſe, *viz.*

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for what occaſions and after what manner, the veſſels affected of either ſort depoſite their burdens into the cavity of the belly.

The kinds of a Dropſie.

Firſt therefore, that the watery part of the blood ſweats out into the *Aqualiculum* or belly, either the very Blood, or veſſels containing it, or both together, are in fault. The Blood is in fault, when being depraved in its Craſis it doth not rightly contain within its conſiſtence the conſtitutive parts, but being apt to be diſſolved, it every where rejects its ſeroſities from the mixture; which either it drives out by Urine or Sweat, or permitting them to reſide within, pours them out into the Pores of the fleſh, or the cavity of the bowels. The veſſels bringing blood grow faulty for a ſecond reaſon, for that their extremities or little mouths either are too much looſe, or altogether ſhut up. In the former ſtate the clew or Circulation of blood is not entirely and firmly continued; but the thinner and more crude part of the blood being apt to depart, is ſuffered to flow out near to the interſpaces or inoſculations of the Arteries and Veins; likewiſe on the other ſide, when the courſe of blood is hindred, by reaſon of a tumour or obſtruction of ſome veſſels, their little mouths being thoroughly cloſed; to this being ſo ſtraitned that a paſſage may be made open by ſome means that which is thin and watery is extravaſated, and ſent away into the neighbouring places, as we have ſhewed above.

The Deſcription of an Aſcites.

2. In reſpect of the Lymphaducts.

2, & 3. But an Aſcites beginning alone, doth often ariſe, by reaſon of the milkie or lymphatic veſſels being depraved; wherefore ſeeing we ſuppoſe the cauſe of this kind of diſeaſe to be oftentimes conjunct, we muſt enquire, by what means, and for what occaſions, theſe veſſels are wont to be ſo opened or burſt aſunder, that they pour out their liquor into the cavity of the belly.

Firſt therefore as to what belongs to the Lymphaducts, theſe veſſels may be in fault after a diverſe manner, but chiefly, either that being obſtructed or compreſſed near their origine, they do not receive the humour, or being burſt about the middle or extream parts, do pour it out into the belly. There are many cauſes and reaſons of effecting of either of theſe, for it may be viſcous matter obſtructs their beginnings, or glandulous, ſcirrhous, and other preternatural Tumours compreſs them, as alſo a vaſt inundation of Lympha flowing out, moreover vehement motions of the Body, or paſſions of the mind, may burſt them aſunder.

3. In reſpect of the milkie veſſels.

2. The milkie Veſſels, no leſs than Lymphatick, are in danger to be broke, and ſo by pouring out their liquor into the cavity of the Belly, do excite the Dropſie called Aſcites; and truly they are wont to be hurt for the like reaſon, in regard their middle paſſages, or their ends, either are obſtructed by a more viſcous chyle brought into them, or by Phlegm from the inteſtines, or they are compreſſed by Tumours bred in the Meſenterie: for forthwith the chyle entering into the beginnings of the veſſels, and not finding a paſſage, firſt very much diſtends them, and afterwards breaks them. There are many cauſes and occaſions, for which the thicker and obſtructing humours are driven forwards into the milkie Veſſels; for beſides an irregular Diet, and for the moſt part from meats hard to be digeſted, this evil is frequently cauſed by too much drink, or immoderate exerciſe immediately after Food, alſo from cold drink while the Bowels are very hot; for ſo the paſſages of the Veſſels before gaping are ſuddenly ſhut, and afterwards more narrowly cloſed, wherefore the chyle ſticking within their ſtraitned chanels, doth throughly fill and obſtruct them in a ſhort ſpace.

The differences of this diſeaſe.

As to what belongs to the differences of this Diſeaſe, beſides them already cited, *viz.* that it comes after an Anaſarca, or comes ſolitary; that this alſo is manifold and after a diverſe manner, according as the Veſſels bringing blood, or water, or milk, are found in fault; Moreover we obſerve, that the Dropſie called Aſcites ſometimes proceeds from a meer watery homour filling and diſtending the parts of the nether belly; but ſometimes there happens to this diluge an extenſion of the membranes, or inflations made by the irregularities of the inmate ſpirits, and ſo they do encreaſe the ſwelling of the Abdomen; and in this caſe a certain Tympanites comes upon an Aſcites, even as more frequently on the contrary, this is the offſpring of that.

Moreover, in an Aſcites meerly watery, ſometimes the Lympha only fluctuates within the Cavity of the Abdomen, ſo that in the mean time the bowels being ſoakt in it, continue ſtill entire, or little or nothing encreaſed in their bulk; but ſometimes beſides the inundation of the Lympha in the hollow of the Belly, the blood being ſlowly circulated there, and almoſt ſtagnating it is much diluted with water. Moreover the Parenchyma of the bowels, and the ſides of the Veſſels and of the membranes, and chiefly the Glandules every where numerous, being moiſten'd, do ſwell with the flowing water

water, and ſo the tumour of the belly conſiſting as it were of many pools of water and mooriſh Contents, riſes into a vaſt bulk. PHAR. Part. II.

The Prognoſtick of this Diſeaſe, is always ſuſpected and accounted of an ill omen: for none of the vulgar but will pronounce the obſtinate tumour of the belly to be very dangerous and difficult to cure: If any ſeem to be affected with a Dropſie, or a Conſumption, with them preſently the next queſtion is, Who ſhall be his heir. *The Prognoſtick.*

An Aſcites beginning after an Anaſarca (which proceeds commonly from the whole maſs of blood being pour'd forth into ſeroſities, and ſweating them out of the little mouths of the Arteries into the cavity of the Abdomen) is accounted of eaſier cure, or at leaſt of more promiſing hope, than that ſolatary diſeaſe coming from tumours about the Bowels, or from the Lymphatick or Lacteal Veſſels being burſt aſunder; for as well the conjunct as procatarctick cauſe of the former Diſeaſe, oftentimes is uſed to be removed wholly, or in part; but in the other caſe, both for the moſt part exiſt incurable. A reddiſh Urine, lixivial, and little, in an Aſcites is of ill ſignification, for 'tis a ſign that the maſs of blood, being repleated with a ſcorbutick Salt and Sulphur boyled together, is too much bound up in its ſubſtance; inſomuch that it doth not well ſeparate the feculencies, nor diſcharge them by fit and convenient Sinks, which notwithſtanding it doth evilly diſpoſe by conſtraint into the Cavity of the Belly, foraſmuch as it is hindred in its Circulation in the very ſame place. For in an Aſcites the blood is not always diſſolved as in an Anaſarca, but ſometimes appears too much compacted in its temper, yet ſo, that the ſalt Serum being denied to the Pores of the skin, and to the Urinary paſſages, by reaſon of the Obſtructions of the Bowels is forced to break out within the abdomen.

If in an Aſcites, by a Purge taken, the waters are evacuated with eaſe plentifully by ſtool, and from thence the ſwelling of the belly is ſomewhat diminiſhed, we are not to deſpair of the Cure; but if Purgers bring out little or nothing of the Serum, or Lympha, and thence by reaſon of the Nervous Fibres being irritated, and driven into extenſions or inflations of the Bowels and Membranes (as it uſes frequently to be) the belly ſwells the more, and grows like a Drum, we may expect only a fatal event of the Diſeaſe.

About the curing of the Dropſie called *Aſcites* it behoves us chiefly to conſider by what ways the waters heaped within the Abdomen, may be thence brought out, and evacuated, for ſuch an evacuation ought to be attempted only by poſſible ways. And here preſently is to be obſerv'd, that the remedies uſed for Hydragogues according to the ordinary practice of Medicine, intend to accompliſh that end by purging, by Urine, by Sweating, and by inſenſible tranſpiration: In ſome caſes of the Sick you ought to proceed by this way, and in other caſes rather by that way, or another, and if none of theſe ſeem feaſable, or ſucceed well, let mature conſultation be had for a Paracenteſis. It will be worth our labour to weigh every of theſe kinds of Medicines, and the reaſons of every one, and the manner of their operations, and with how much vertue Hydragogues are endowed. *The cure of an Aſcites.* *By what and how many remedies the eduction of the water is to be endeavoured.*

Firſt, therefore as to what relates to Purging, we have in another place ſhewed that, from the irritation of the Phyſick made in the belly and guts, as well the Contents and wind of theſe bowels, as moreover the humours driven into their Coats and Glandules, and which are heaped up in the Veſſels and Pipes in the neighbouring parts, are diſquieted, and partly ſtreined into the paſſages of the guts, and partly returned into the maſs of blood; inſomuch that the tumour of the abdomen ariſing from the ſtoppage, and as it were a wateriſh affection of thoſe kind of Parts, is often abated by Purgatives ſeaſonably adminiſtred, and ſometimes wholly removed; but it doth not ſo ſucceed when it proceeds from a Lympha fluctuating within the cavity of the abdomen, or from an inflammation of the Membranes, or from a tympanitic extenſion: becauſe Hydragogues do little or nothing bring out thoſe waters, and if they be of the ſtronger ſort, they increaſe this paſſion and exaſperate it by inflaming the part. *Firſt by purging.*

Catharticks uſed for Hydragogues, are either Vomits, or Purges; they exert their power in the ſtomach, and theſe rather in the Inteſtines; inſomuch that they powerfully provoke and twitch the Nervous Fibres; and together pour forth the blood and nervous liquor by a certain ſeptick force, and do cauſe the ſerous humours wherever impacted to be ſtirr'd, and do cauſe them plentifully to be ſent away by the paſſage granted. Either are reckon'd of a various kind, *viz.* either ſimple or compound, gentle or ſtrong, by the Ancients as well as by the Moderns; ſome of which that are moſt chiefly noted, we will here briefly obſerve. *Catharticks are either Vomits or Purges.*

1. *Emetick Hydragogues*, chiefly famous, are Gambugia, Eſula, Spurge, and their ſeveral Preparations, as alſo the *Hercules* of *Bovius*, and the *Pilulæ Lunares*.

2. *Purgers*

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2. *Purgers* are Elder, and Dwarf-Elder, Soldanella, Gratiola or Hedge-hyſop, the Juice of Orris, and Elaterium. We will briefly preſcribe ſome methods either of preparing or compounding or adminiſtring each of theſe.

The chief medicines of either kind.

1. Gummi guttæ.

1. *Gambugia*, firſt an *Indian* Medicine, being from thence brought by our Countrey-men, from the Painters Shops coming into the Apothecaries, began to be in uſe, and is much magnified for Purging out ſerous humours. But foraſmuch as taken by it ſelf it vehemently diſturbs the Stomach, and often weakens it, therefore, that the outragious and violent Vomiting force may be ſomewhat abated, there are divers ways of its Preparation invented; but truly it is beſt corrected with an acid Spirit, or with an alcalizate Salt, or by thoroughly mixing and correcting it with aromaticks.

Its various Preparations.

Adrian à Mynſicht, extolls the magiſtery thereof, which is made by a diſſolution in Spirit of Wine, and after drawing it off, and precipitating it with Spring-water; alſo diſſolving it with Spirit of Wine vitriolated, and with Incture of Roſes, and red Sanders, and after by evaporating it: others prepare it with the fume of Sulphur after the manner of Scammonie ſulphurated; others grind it on a Marble, moiſtening it with Oyl of Cinnamon, or Cloves, or other Chymical Aromaticks. I uſe moſt the *Solution thereof made with a tincture of Salt of Tartar, the doſe from* 15 *drops to* 20 *or* 30.

The forms of Hydragogues prepared thereof.

Take of Gum-gutta, gr. 6. Mercurius dulcis, gr. xv. Conſerve of Violets, a dram and a half, make a Bolus.

Take of Gambugia twelve grains, Salt of Wormwood fifteen grains, Oyl of Mace one drop, Conſerve of Damask-Roſes one dram, make a Bolus: and it is wont to be given with Tartar vitriolate or Cream of Tartar, and powder of Rhubarb.

Take of Gum-gutta ſulphurated, or vitriolated, fifteen grains, Cream of Tartar half a ſcruple, Extract of Rhubarb one ſcruple, Oyl of Cinnamon, gut. 2. *make* 4 *Pills.*

Lately, a Woman afflicted with a moſt painful Aſcites, and moſt deſperate, as it ſeemed to me, the enſuing Medicine being taken for 6 days ſucceſſively, ſhe began to be much better, and in a ſhort time afterwards recovered her health entirely.

Take of powder of Gum-gutta twelve grains, Oyl of Cinnamon one drop, with ſyrup of Buck-thorn, make a Bolus, the doſe daily to be augmented, aſcending from twelve grains to twenty.

Take of our Tincture of Gum-gutta one ſcruple, water of Earth-worms one ounce, Syrup of Rhubarb half an ounce, mix them, and let it be taken with government.

2. Spurge. The Preparations thereof.

2. Whereas there are ſeveral ſpecies of Spurge, or *Tithymalus*, and all of them work more violently either by Vomit or Stool, by reaſon of the notable provocation they make in the bowels; and for that cauſe do abundantly bring out ſerous humours; yet by reaſon of the too outragious force of many of them, the leſſer Spurge for the moſt part only is now in uſe, and the preparations thereof moſt of all magnified are, the powder of the bark of the Roots, and the Extract, and we think fit to add the tincture inferiour to none of the reſt.

Take of Spurge with the Roots cleanſed four handfuls, Lignum-Aloes and Cloves, of each one dram, bruiſe them and boyl them in four pound of Spring-water, to half, the ſtrained Liquor clarifie by ſeparation or ſettling in a long glaſs, afterwards evaporate the clear liquor in a Bath heat, to the conſiſtence of an Extract, the doſe one ſcruple.

Forms.

Take of this Extract half an ounce, pour upon it into a matraſs of the Tincture of Salt of Tartar 6 *ounces, digeſt them in a Sand-bath to the Extraction of a Tincture, the doſe from* 20 *drops to* 30 *in a convenient vehicle.*

Take of the Powder of Spurge from ſeven grains to ten, Cinnamon half a ſcruple, Salt of Tartar eight grains, mix them together in a glaſs mortar, give it by it ſelf or mixed with a fit Conſerve, or Syrup, make a Bolus or Pills.

The Hercules *of* Bovius.

2. *Precipitate* of Mercury with Gold, or the *Hercules* of *Bovius* which is much extolled by the Author for curing Dropſies; it is deſcribed in a former Treatiſe in the Chapter of Vomits, and the manner of preparing, and the working thereof, and the Reaſons are there delivered. This Medicine, inaſmuch as it twitches the ſtomachical fibres by its acrimony, and pours out the blood by reaſon of the mercurial and ſalt particles, cauſes or ſtirrs up a fierce Vomit, and thereby cauſes the ſerous humours, violently ſtrained into the Cavities of the bowels, to be ejected.

3. The Pills called *Lunares* produce the ſame effect in like manner, by reaſon of the

the vitriolate particles of Silver ſharpened with other ſaline menſtruums, *viz.* by wrinkling of the fibres of the Bowels very much, they force the ſerous humors to be ſtrongly ſtrained into their paſſages, and ſo to be evacuated. PHAR. Par. II.

Pilulæ Lunares.

A Solution of Silver made in Stygian water, and well cleanſed, and by a little evaporation is reduced into pleaſant Cryſtals, which by themſelves (or with an addition of Salt Nitre to abate the fierceneſs of the Lunar Vitriol) are made into Pills with crums of bread : the doſe is one Pill, ſometimes two or three, reſpecting the ability of ſtrength and working. Medicines of this kind are exhibited ſometimes with ſucceſs in a ſtrong conſtitution, and bowels ſtrong, and a good habit ; but they are ſcarce ever conveniently or rarely without prejudice taken by tender and cachectical perſons.

Purging Hydragogues.

Hydragogues meerly or chiefly purging, are either of a more mild ſort, as Elder, Dwarf-Elder, Soldanella, and juice of Engliſh Orris, which ſeldom being adminiſtred by themſelves, do want the ſtirring up of ſharper Medicines, and on the other ſide they blunt their too much fierceneſs ; or they are of a ſtronger ſort, as *Gratiola* or Hedge-hyſop, Jallap, and Elaterium.

Elder and Dwarf-Elder.

The ſeeds or grains of Elder and Dwarf-Elder being dryed, are reduced into a powder, which being taken to the weight of one dram, doth gently bring forth ſerous humours by ſiege ; Water and Spirits are diſtilled of the juice of either ſorts of Berries fermented, alſo Robs and Syrups are made of them ; which with many other Preparations of thoſe Vegetables, are much magnified for all hydropical Diſtempers,

Soldanella.

Soldanella and *Gratiola*, are rarely uſed by themſelves in our age, neither are any neat and very efficacious Medicines prepared out of thoſe Simples ; they are frequently mixt with certain other Hydragogues, and chiefly are ingredients in compounding Apozems.

The juice of Orris.

The Juice of *Engliſh Orris* is a very profitable Medicine, and becauſe to be eaſily procured for the Poor, is the more to be eſteemed : It is given from ſix drams to an ounce and a half, or two ounces, either by it ſelf in a fit vehicle, or with other things appropriated thereunto. Jalap is a moſt known Medicine againſt every Dropſie, and common enough. And one of the common People ſuffering under that diſeaſe, preſently takes of the powder of the root of Jalap a Pennyworth, mixt with Ginger and White-wine, and the deſired effect doth frequently follow this remedy uſed with intermiſſion.

Elaterium.

Elaterium is rightly eſteemed the moſt powerful Hydragogue, for that it moſt painfully provoking the ſplanchnick Fibres and together melting the blood and humours by a certain corroſive force, compells whatſoever ſeroſities the Coats of the Bowels, Membranes, Veſſels, alſo the Glandules, and fleſh do contain in themſelves, to be poured out into the cavities of the Stomach and guts : by which Medicine happily working, the aſſwaging of the Abdomen doth ſometimes ſucceed. Truly this is the chief weapon of the Empirical Magazine againſt any Aſcites ; which they notwithſtanding uſing in all caſes, do oftener adminiſter to the hurt than benefit of the Patient : the doſe is from three grains to ten or fifteen, taken either by it ſelf, only with correcting ſpices added, or it is given with other hydragogues in form of a Powder, Pills, or Electuary. The tincture and eſſence of it are extracted with Spirit of Wine, or with tincture of Salt of Tartar.

The forms of Hydragogues.

Theſe are the chief ſimple Hydragogues, from which being prepared with the addition of others, many compounded ones as well Magiſtral as common in Shops are made, and are every where in uſe ; moreover, very many more might be preſcribed extemporarily, as occaſion ſerves. Of theſe we will here annex a few more ſelect forms, and chiefly thoſe that are taken in the form of Potions, Powders, Electuary and Pills.

A Tincture.

Take of Dwarf-Elder, Engliſh Orris, of each an ounce and half, leaves of Soldanella and Gratiola i. e. *Hedge-hyſſop of each one handful, Aſarum, and Aſſe Cucumber-roots of each two ounces, roots of leſſer Galangal ſix drams, choice Jalap half an ounce, Elaterium three drams, Cubebs two drams, ſhred and bruiſe them, and pour upon them three pound of ſmall Spirit of Wine tartarizated, digeſt it ſtopt cloſe in Sand for two days, ſtrain it clear and depurate it by ſettling. The doſe from two ſpoon-fuls to three, in a convenient vehicle.*

Powder.

Take of Elaterium, Soldanella, Ginger, of each one ſcruple, Galangal, Cloves, Cinamon, of each half a ſcruple, Salt of Tartar fifteen grains, make a powder for two doſes.

Pills.

Take powder of Jalap one dram, Ginger one ſcruple, Cream of Tartar 15 *gr. make a powder to be given in a draught of White-wine.*

Take of Rhabarb one ſcruple, Elaterium 5 *grains, Tartar vitriolated half a ſcruple, Spicknard three grains, with Syrup of Buckthorn make four Pills.*

Take

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Take of Pill Aloephangina half a dram, Elaterium half a Scruple, Oyl of Cloves gut. 3. make four Pills.

Bontius hydropick Pills are given from half a ſcruple to half a dram, prepared thus:

Take of Aloes two drams and a half, the preparation of Gum-gutta one dram and a half, Diagridium corrected one dram, Gum Ammoniacum diſſolved, one dram and a half, Tartar vitriolated half a dram, make a maſs, and form it into Pills.

Electuaries. Certain hydragogue Electuaries are now every where in uſe, and celebrated by practiſers. Of which ſort are, 1. One deſcribed by the renowned *Sylvius*, and the other by *Zwelfer*, This following pleaſes us.

Take of Reſine of Jalap two drams, Tartar Vitriolate one dram, Extract of Rhubarb two drams, of Spurge a dram and a half, leſſer Galangal one dram, beat them in a mortar, and laſtly add of Conſerve of the flowers of Engliſh Orris, four ounces, and with Syrup of Peach-flowers make an Electuary, the doſe from half a dram to a dram and a half, or two drams.

2. Diuretick Hydragogues. I might here ſet down or deſcribe many other purging Hydragogues, but Cathartick do not always cure an Aſcites, yea oftentimes exaſperate it, and (if they be long continued) render it incurable; hence it is neceſſary to have recourſe to other Remedies for the Cure of this diſeaſe. Wherefore, let us next enquire whether Diureticks do here profit or not?

And truly any one may eaſily think that Remedies moving Urine conduce very much for draining waters out of every place or cavity of the body. In truth it is manifeſt by frequent experience, theſe do often cure an Anaſarca before any other Remedy; let us ſee what they may effect for the emptying the Cavity of the Abdomen.

What Profit they bring in an Aſcites. As to this it firſt appears, that there is no paſſage immediately open from an Aſcitick pool to the Reins, although contiguous; but that whatſoever waters are transferred from hence thither, muſt of neceſſity firſt be drunk up in the maſs of blood, and from thence be poured out of its boſom into the ſink of Urine; and truly it is but a little which the gaping little mouths of the veins about the ſuperficies of the bowels can receive (if perhaps they are open at all) and Diureticks can but effect this one thing, that by pouring forth the blood, and forcing its ſeroſities more plentifully to the Kidnies, they cauſe the waters fluctuating in the belly to be allured to it being ſo emptyed; in the mean time there is no leſs danger, leſt Diureticks being unſeanably adminiſtred, while they diſſolve the blood too much, they conſtrain the ſerum to depart into the ſeat of the Aſcites, more than into the Reins, and ſo rather augment than remove the inundation of the belly. For that it ſometimes ſo happens, I have often found by experience; wherefore when Diureticks are preſcribed to cure an Aſcites, we muſt chiefly provide againſt ſuch a contrary effect. For this reaſon indeed Aſtringents and Corroboratives are always mixt in Remedies for the Dropſie (founded on experience, and the Authority and Practice of the Ancients) not that ſuch (as is commonly ſaid) do confirm the Tone of the Liver, but conſerve the temperature, and mixture of the blood, leſt it be wholly diſſolved by too great a fuſion. Wherefore in an Aſcites which chiefly or in part happens by reaſon of the frame of the bowels and veſſels, and chiefly the Coats, Glandules, and their little ſtrings, and their interſpaces being ſtuffed by a ſerous humour, and therefore very much ſwell'd up, as Cathariks ſo alſo Diureticks profit, and are frequently taken with ſucceſs; forasmuch as by the uſe of theſe the maſs of blood being emptyed, (the ſerum being more plentifully derived to the Kidneys) doth eaſily receive unto it ſelf thoſe waters every where ſtagnating about their little mouths, and conveys it towards the urinary ſink: but on the contrary, in a meer Aſcites where the heap of waters do overflow the Cavity of the Belly, the Textures of the bowels being free from the ſerous ſtuffing; Diureticks are given in vain, or incommodiouſly; inaſmuch as they expreſs nothing from this Lake of the belly, and moſt frequently by diſſolving the blood more impetuouſly drive together the waters apt to be inſtill'd there.

With what choice and difference they ought to be adminiſtred. Not all Diureticks of every kind are equally convenient in an Aſcites, neither ought they indifferently to be adminiſtred; for we muſt obſerve, the affected in this diſeaſe for the moſt part make a little, reddiſh Urine, and as it were lixivial; which truly is an indication that the temperature of the blood is too much bound in them

them, by reaſon of the fixt and ſulphureous Salt exalted and combined together: and therefore that the Serum is not duely ſeparated within the reins; which notwithſtanding is ſhook off about the windings of the obſtructed bowels, and ſo is depoſited in the Cavity of the Belly. Wherefore in this Caſe it will be convenient to drink only thoſe things to excite Urine, which ſo reſtore and amend the Conſtitution of the blood, that the enormities of the fixed Salt and Sulphur being taken away, the ſerous part might be ſeparated within the reins, and more plentifully diſcharged; for which purpoſe, not acid or lixivial things, but thoſe endowed with a volatile Salt are appointed. For I have often obſerved in Patients of that kind, when the Spirit of Salt, and other acid drops of Minerals, and when the Diſſolutions and Deliquiums of Salt of Tartar, Broom and other things, have done more hurt than good, that the Juice of Plantane, Brooklime, and other Herbs abounding with a volatile Salt, have much helped, as alſo the expreſſions of Millepedes: for the ſame reaſon Salt of Nitre throughly purified or Cryſtal Mineral doth often profit. Forms of Medicines more accomodate for this uſe are extant in our former Treatiſe, where, *viz.* examples of Diureticks are deſcribed, in which both volatile and nitrous Salts are the Baſis. Moreover, hither ought to be referred the notable experiment, by which *Joannes Anglus* affirms himſelf often to have cured the Aſcites from a hot cauſe, which Medicine alſo that expert Phyſitian Dr. *Theodore Mayern* was wont to magnifie and preſcribe in the like caſe.

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John Engliſh *his Empyrical remedy.*

Take of the juice of Plantane and Liverwort, and fill an Earthen pot to the top, which being ſtopt cloſe, put in a hot Oven after the Bread is drawn, and make a little fire on the ſides of the pot to continue the Heat of the Oven; after it is ſo boyl'd ſtrain it, and being ſweetned with Sugar, drink of it Morning and Evening, and it cures. In imitation of this I have often with ſucceſs preſcribed as followeth.

Take of green Plantane-leaves four handfuls, Liverwort, Brooklime, of each two handfuls, bruiſe them together, and pour upon them half a pound of ſmall compound Radiſh-water, or other appropriate Magiſtral, expreſs it ſtrongly, the doſe three ounces three times in a day.

Although Diaphoreticks are moſt efficacious in an Anaſarca, yet in an Aſcites they are rarely or not at all uſed: for being unſeaſonably offered, they impreſs oft-times great hurt on the Patient without any avail; foraſmuch indeed as by heating the blood, they cauſe the fluctuating waters to grow hot, and as it were to boyl in the hollowneſs of the belly; ſo that the ſpirits and humours are diſturbed by vapours raiſed from thence; and ſo a diſorder of all the functions follows, and the very bowels being as it were boyled, are much prejudiced. Moreover from ſweating unadviſedly inſtituted, the blood being forced into a fuſion and precipitation of the Serum throws it off the more into the neſt of the Aſcites. Wherefore when ſome preſcribe fomentations, and liniments, and bathing, to be applyed to the ſwelling Paunch of the Belly, for the moſt part it turns to the worſe in ſuch Patients; for beſides a little Feaver, a Vertigo, fainting of the ſpirits, and other ill ſymptomes of the brain and heart, being moſt frequently ſo raiſed, even the belly alſo doth from thence ſwell the more: foraſmuch as the Blood being agitated and poured out, depoſits in that place more largely the Serum; and for that cauſe the mouths of the Veſſels are more looſened and opened, ſo that they may more readily let fall water prone to depart from the maſs of blood. But the Remedies which are chiefly wont to be adminiſtred with ſucceſs near the places affected (when a Cure is intended without a Paracenteſis) are Clyſters and Plaiſters.

How beneficial Diaphoreticks are in an Aſcites.

The former draw the Serum out of the Veſſels and Glandules of the Guts and Meſentery without fuſion of the whole maſs of blood, (which the ſtronger purging Medicines do excite,) which being ſo emptyed do imbibe a little the extravaſated Lympha. For this purpoſe the enſuing Clyſter, wont to be preſcribed by us in this caſe, is moſt fit, in regard it contracts the inteſtinal fibres together, and draws the Serum imbibed by the blood, or contained formerly therein, towards the Reins.

Clyſters and Plaiſters.

Take a pint of Urine of a ſound man that drinks Wine, Venice *Turpentine diſſolved with the Yolk of an Egg, an ounce and a half, Sal Prunella one dram and a half, make a Clyſter, which repeat daily.* Sometimes Plaiſters yield help in an Aſcites, yet let them be ſuch, as by a certain reſtringent and comfortable virtue ſtrengthen the bowels and bind together the mouths of the Veſſels, leſt they too much ſpue out their ſeroſities: for this purpoſe, I uſe to apply the Plaiſter *Diaſaponis* with ſucceſs. Or,

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Take of the Plaiſter of Minium, Paracelſus *Plaiſter, of each what ſuffices, make a Plaiſter to be applyed to the Abdomen.* If this diſeaſe is accompanied with a Tympany, Epithemes of another manner are fit, as we ſhall hereafter declare.

When and to whom a Paracenteſis is convenient in an Aſcites.

The great and moſt preſent Remedy of an Aſcites, is, that the waters may be drawn out by a Paracenteſis being made; which adminiſtration however doth not oftner cure the diſeaſe, than kill the Patient; wherefore there is need of exact caution to whom, and at what time of the diſeaſe it ought to be adminiſtred: to perſons of an ill habit, who have been long ill, in whom the conformation and temper of the bowels is wholly depraved, it will be in vain to have the Lympha drawn out by the Paunch being pierced; for thereupon immediately the Spirits faint and the ſtrength is diſſolved, and after a while a new illuvies of the morbific humour ſucceeds. But thoſe who being formerly of ſound bowels, and healthful enough, as to other parts, when they fell into an Aſcites from ſome great and evident cauſe, as we are not at firſt preſently to make a Paracenteſis, ſo neither if it be needful ought we to defer it too long: for an incorrigible depravity of the Bowels is contracted by a longer delay, while they remain a long while drowned, and as it were boyled in water.

It is beſide our purpoſe to deſcribe here the adminiſtration of a Paracenteſis, whether it be done after the ordinary manner, or by a hollow Needle according to *Sylvius*; this part of Chirurgery, as dangerous, when Phyſitians ſeldom preſcribe, yet Quacks and Empiricks raſhly and unluckily eſſay it, Artiſts not being conſulted: we will relate here for concluſion the Hiſtory of a true and huge Aſcites, lately cured without any Paracenteſis.

A hiſtory of a cure.

A young Woman wife to a Merchant, being ſlender and proper, while ſhe gave ſuck to her Child, to encreaſe her milk day and night did immoderately guzzle one while plain Ale, another while Poſſet drink. After having uſed this kind of dyet for a fortnight, ſhe contracted a vaſt Aſcites in a ſhort time, the beginning whereof ſhe was not in the leaſt ſenſible of; for her Abdomen being great with water fluctuating within, did much ſwell up, and its bulk when ſhe turned from one ſide to the other, fell without the Ileon and borders of the reſt of the body: when in the mean while the fleſh of all her Members was very much conſumed, that ſhe ſeemed no leſs in a conſumption than a Dropſie.

The Child being weaned, and a better courſe of Diet being appointed, ſhe betook her ſelf to Medicines, and took in the firſt place the more mild Hydragogues, as well purgative as diuretical, but without any advantage; alſo ſhe was worſe after every purge; but being committed to our care, and almoſt deſperate, I handled her after the enſuing method.

I preſcribed theſe Medicines, for the moſt part forbidding Ale, and any potulent liquor (medicines excepted.)

Take of the leaves of Plantane, Brooklime, Clivers, of each 4 handfuls bruiſed, and pour upon them of water of Earth-worms and Rhadiſh compound of each three ounces, preſs them, take it twice aday, viz. *at Eight in the Morning, and at Five in the Afternoon. She continued long in the uſe of this Medicine, but did ſometimes vary the Compoſition, ſometimes changing the herbs, ſometimes the Liquor poured on them.*

Take of the reddeſt Tincture of Salt of Tartar an ounce and a half, ſhe took 20 drops at night, and early in the morning, in two ſpoonfuls of the following Julep, drinking ſeven ſpoonfuls after it.

Take water of Elder-flowers, Saxifrage, of each ſix ounces, water of Snails, Earthworms, and Rhadiſh-compound, of each two ounces.

She wore a Plaiſter of Minium and Oxycroceum upon her Belly.

The following Clyſter was given firſt daily, afterwards every two or three days.

Take Urine of a healthy man one pound, Turpentine diſſolved with the Yolk of an Egg an ounce and a half, Sugar an ounce, Sal Prunella one dram, make a Clyſter.

By the conſtant uſe of theſe things her Belly aſſwaged within a fortnight, but her fleſh daily waſting, a Conſumption was threatned. Wherefore, going into the Countrey to avoid this, ſhe drank Aſſes milk; by the benefit of which Nutriment and of purer Air, coutinually taking the above-mentioned Medicines, ſhe recovered her entire health within three or four weeks, and lives yet in health.

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Of a Tympanie.

A Tympany vulgarly, although not properly, is eſteemed a kind of Dropſie, from which rank, *Proſper Martianus* alleadging the teſtimony of *Hippocrates*, rejects as well this Diſeaſe, as an Anaſarca. But the former infeſting the region of the Abdomen, and raiſing it up into a bulk, now comes under conſideration next after an Aſcites, (to which it is ſomething a-kin) : where firſt of all it is obvious, that this Diſeaſe as it is moſt difficult to cure, ſo alſo to be known; for although its outward form, *viz.* a ſomewhat hard ſwelling of the belly, very ſtiff and yielding a ſound like a Drum, upon touching it, is evidently perceived by many ſenſes together; notwithſtanding what may be the morbifick matter inducing that Tumour, or after what manner it is generated in the belly, or from what place it comes thither, is altogether unknown: therefore thoſe who have a Tympanie, as though they were big with wind, are ignorant both of the manner and time of its conception. Truly I therefore judge the nature and cauſes of this diſeaſe to lye concealed, becauſe whereas its firſt beginnings are not obſerved, it ſuddenly augments prodigiouſly; ſo that they who are affected, do ſcarce ſooner perceive themſelves to be ſick, than that they are become almoſt incurable. Moreover, a Tympanie, its ſtation being accompliſhed, degenerating into an Aſcites, or rather procuring it to its ſelf, ſeems to loſe its own nature; and truly after death Anatomical inſpection ſcarce diſcovers any thing more in bodies dying with a Tympany, than with an Aſcites. But that many Phyſical Authors do readily declare this Diſtemper to be raiſed by wind encloſed within the cavity of the abdomen, doth not at all ſatisfie a mind deſirous of the truth; becauſe it ſeems altogether improbable that winds ſhould be produced ſo ſuddenly, and in ſo great plenty in that place; or admit they were, that ſo hard, unmoveable and conſtant a tumour ſhould be raiſed.

A Tympany not properly a kind of Dropſie.

Wherefore its cauſe is occult.

Commonly aſcribed to Wind.

Moreover they do not eaſily agree concerning the ſeat of the diſeaſe, where the wind is ſuppoſed to be included; for ſome affirm that this place is determinate in the concave of the Peritonæum, and by the convex ſuperficies of the Inteſtines, and other bowels of the lower part of the belly; but after what manner ſuch a heap of winds can be therein collected, in my opinion it cannot be manifeſted by any reaſon, example, or parallel inſtance. Beſides, if the caſe were ſuch, it might be more eaſily cured by pricking, than an Aſcites by a Paracenteſis; which yet I never heard accompliſhed. *Helmont* reports a ſtinking wind was vented by a Paracenteſis, in one eſteemed Hydropick; that ſuddenly his Abdomen ſunk, and the man dyed immediately. But *Platerius* and *Smetius*, no leſs worthy of credit, do affirm, *They diſcovered in ſome who were thought to have the Tympanie, and diſſected after death, that no wind broke forth out of the hollow of the belly, neither that it fell, but that eſpecially the ſmaller guts being diſtended, and ſtrutting with wind, burſt out ſo, that they could not be put up again into the ſame belly.*

Authors do not agree about the ſeat of the Winds.

Not without the guts in the cavity of the Abdomen.

But truly neither is this obſervation an argument to me, that the cauſe of the diſeaſe (of which we treat) remains within the Cavities of the guts, and that the winds accumulated in that place, do often or moſt of all raiſe a Tympanitick ſwelling of the belly. For beſides that, a diſeaſe taking riſe from ſuch an occaſion, would not be ſo immovable, and frequently incurable; moreover, I am induced to think, that the Inteſtines are not ſo greatly dilated by winds ſhut up in them, but that they often of their own accord ſwelling out, give occaſion to thoſe winds conſequently and ſecondarily to be produced, by which the ſpaces enlarged might be filled, as we ſhall by and by more clearly demonſtrate.

Nor within their paſſages.

But what is aſſerted by others, that the winds which are the cauſe of a Tympany are engendred amongſt the Coats of the Meſentery, and Guts, ſeems yet much more improbable; becauſe when there is no cavity in that place preexiſtent, after what manner can the winds ſo tear thoſe parts and ſeparate them from one and another, ſo that from ſuch formed Denns, the whole region of the Belly ſhould grow into ſo vaſt a bulk by accumulated winds there laid up? Certainly ſo many and ſo great divulſions could not be made without continual torment and moſt ſharp pains.

Not between the coats of the bowels.

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By what and how many cauſes the Belly ſwells.

Wherefore, omitting theſe opinions already ſpoken of about a Tympanie, let us proceed another way to the more aſſured ſearching out its Pathologie; *viz.* by thorowly weighing by what means, and by what evident cauſes, the Abdomen is wont to ſwell up. Wherefore, we advertiſe there are four kinds of things contained, from which proceeds a tumour in the nether Belly of the living, (why the Abdomen ſwells in dead perſons, the reaſons follow hereafter) which kinds, are, ſolid, humid, wind and Spirits.

1. From tumours of the Bowels in that place.

Firſt, It is obvious enough, that the inward tumours of the bowels, *viz.* ſcirrhous, ſtrumous, cancrous and glandulous, and ſome perhaps of another kind, when they riſe to any notable bulk, do ſwell the whole belly; yet in the mean time as long as they are ſimple, and new, they may be perceived and circumſcribed by the touch; yet afterwards growing inveterate, they cauſe other evils to the neighbouring parts, yea over the whole Region of the Abdomen. Truly theſe as they are ſometimes the procuring cauſe of an Aſcites, ſo of a Tympany from the beginning, to which afterwards for a complement of either diſeaſe, another conjunct cauſe gains acceſs, *viz.* an illuvies of waters, or an irregularity of the Spirits.

2. From waters gathered as in an Aſcites.

Secondly, a watery humour gathered within the Cavity of the abdomen, or being impacted in the membranous or glandulous parts thereof, frequently produces an Aſcites, the reaſons whereof, and the manner of its coming to paſs, are at large ſet down before.

3. From winds.

Thirdly, Winds within the bowels of Concoction being raiſed from crudities, ill concoction, or fermentation of heterogeneous humours, do frequently puff up the Cavity of the guts, and for the moſt part produce a ſhort and tranſitory tumour of the belly. For the fermentation of the Juices ceaſing, and eruption of wind being procured, immediately ſucceeds an aſſwaging of the Belly. To this cauſe, both the Colick and Tympanie, not only by the vulgar but by Phyſitians of great note are imputed; but in our judgement, when it is ſolitary it produces neither of theſe diſtempers.

4. From the inflation of the Fibres, by reaſon of the Spirits being diſturbed.

Fourthly, There yet remains another ſudden, and vaſt ſwelling of the belly, which the animal Spirits (not for nothing ſtyl'd by *Hippocrates* violent) ſeem to procure. For when theſe in heaps, and inordinately, ruſh into the nervous fibres belonging to the bowels of the lower belly, preſently the parts that theſe weave together are cauſed to be puffed up, and extended every where round about. For truly, from this cauſe (as we have often ſhewed in another place) a ſwelling, and as it were a tympanitical puffing up of the whole abdomen, as well in the Colick as in Hyſterical fits vulgarly ſo called, doth often happen. And truly theſe diſtempers are ſo allayed to a Tympany, that they frequently end in it; for I have oft obſerved, that thoſe who have been obnoxious to the Colick and hyſterical paſſion long and grievouſly, unleſs they receive cure, do become Tympanitical. And then the greateſt of the difference will be, that the ſwelling of the belly, which before was a wandring Symptom, and ſoon paſſing over, at length grows to be a fixt and permanent diſeaſe.

Wherefore, it ſeems material in this Caſe, to accommodate the Ætiologie of theſe paſſions delivered by us in another place, to unfold the Nature and Cauſes of this preſent maladie.

An Affection of what ſort a Tympany is.

VVhich truly will not be of any great buſineſs or difficulty. For ſuppoſing (what we have in another place more largely ſet down) the extenſions and inflations of the membranes and hollow bowels, take their origine from the impetuous invaſions of the Spirits into the nervous fibres (of which they are interwoven) it will be obvious enough to conceive even a Tympanie to be produced from ſuch a cauſe, but being more fixt, and longer or unceſſantly in the act; into the reaſon of which difference, we will by and by inquire.

Its cauſe and formal reaſon explicated.

In the mean time I am induced to believe a Tympanie not to be ſtirred up from winds ſhut up within, or without the Cavity of the guts, (for ſuch an accumulation of winds in thoſe places, is an effect, but not a cauſe of this diſeaſe) but that it does ariſe, inaſmuch as the animal Spirits, in the bottom of the belly, belonging to the membranous bowels, being forced into diſorder by ſomething incongruous, do tumultuouſly ruſh every where into the nervous fibres, and puff them up, neither do they immediately recede back from them: from hence the Peritonæum ſwells, and the guts being blown up and enlarged, they are as it were inflated, the Meſentery, and other membranous bowels, being turgid with an impetuous Spirit, are as it were raiſed up into a bulk; moreover, while theſe come thus to paſs, that the vacuities cauſed from the ſwelling of hollow Bowels might be filled, a portion preſently of every humour within contained, being rarified into vapours, forthwith turns into wind, wandring about thoſe empty ſpaces.

Truly, we have clearly enough ſhewn, by reaſons and inſtances in our Pathologie of

of Convulsions, that the animal spirits puff up the membranous parts by their irregularity, and so produce as it were this windie Distemper. Moreover the same is demonstrated by Anatomical observation made in dissecting a living Creature; *viz.* inasmuch as the Trunk of the eighth Pair of Nerves descending on each side by the Neck, if it be taken out and bound with a thred, forthwith all the stomach swells up, as if it were puffed with wind; which certainly can proceed from no other cause than that the animal Spirits of the fibres of that bowel, and others flowing through the nervous passages, (inasmuch as they being cut off from their origine, are driven into confusion) do tumultuously enter those parts, and puff them up. Besides these, for the further illustrating of this Hypothesis, I will relate a History cited by the most renowned *Smetius*, of an universal Tympany (as he calls it) in a certain young man of *Liege*: *Who when he had received, in a conflict, under his right arm-pit, a wound, made by a prick, penetrating into the Cavity of his breast, next day and night being past, he appeared in the morning after swell'd throughout his whole body, not only in his breast, but also in his back, belly, loins, and in the cods, besides both in his arms, shoulders, neck and face, that he could not open his eye-lids, also on the crown of his head, the skin being every where swolne and tumefied, the tumour was every where extended with great pain.* The Author calls this wonderful affection, an Universal Tympanie. The most renowned *Sennertus* relates a Case like this from his own knowledge: Moreover, I remember I have heard or read of the like from a wound of the breast being received near the arm-pit.

And proved by arguments and instances.

An universal Tympanie.

Notwithstanding, the reason of this Symptom, deliver'd by *Smetius*, and approved by *Sennertus*, doth not at all please me: for they ascribe the cause of that general Tympanie, *to the puffing up of the breast, by the axillary wound, made all that night under the skin, as we see a new and moist bladder to be blown up by boyes with a quill:* which truly doth not only seem improbable, but also we think scarce possible, that the wind to be blown out of a wound of the Thorax, by reason of the hole one night stopt, can enter the skin, and from thence passing through the whole body, should make it become every where Tympanitical: For besides that the wind cannot so suddenly pass from thence into all parts, although it should be blown with a quill from the mouth, under the skin; besides, while the orifice of the wound is stopt, no wind can altogether be blown out from the Cavity of the breast, because none in the mean time enters. But assuredly the cause of that wonderful affection is this; (whence also the formal reason of a Tympanie is illustrated) In the Breast near the Arm-pits, are many and eminent foldings of Nerves, (as we have described in our Treatise of Nerves,) by which the nerves of the whole body communicate among themselves: *viz.* the Trunk of the eighth Pair unites with the intercostal Nerve, and both with the nerves of the *Spina Dorsi*, by branches and sprigs sent here and there. Wherefore, this nervous folding, perchance being pierced by the point of the Sword, first of all the spirits residing in that place being provok'd, run into disorders, afterwards a consent being immediately made thorow so many notable Nerves, and transmitted to and fro every where, other Spirits, and then again others, are sensible of the like irregularities, and puffing up the membranous and nervous Fibres (which every where they enter tumultuously) they induce as it were a tympanitical affection through the whole body. By reason of the like fury or virulent madness imposed upon the Spirits, in any place, and from thence immediately diffused far and wide, certain Poysons being drunk, the strokes of weapons, or of wild Beasts, or a venemous bite, do frequently induce a swelling together of many parts, or of the whole body; which swelling distemper of the Spirits, is styl'd by *Helmont* to be *Indignatio Archæas*. There are many other Cases and Instances, by which it is most clearly evinced, that the Animal Spirits being provok'd and driven into angry inclinations, inasmuch as they do more impetuously enter into the nervous Fibres, are wont first to swell the membranous parts, and to excite many passions out of those, which are vulgarly but falsely ascribed to winds: so that in truth no other cause of a Tymyanie can be assigned more like truth.

The Cause of an universal Tympanie enquired into.

The true cause assigned.

If it be objected, that the Paunches of the defunct after some time are raised by wind into a bulk, and swell like as in a Tympany: I pronounce this to proceed from the putrefaction of humours, and the extream dissolution of the mixture, wherein all the active particles depart, being freed one from the other, and flying about seek vent in every place, and distend greatly all obstacles, and chiefly the sides of the Cavities, (which doth not at all happen in living bodies;) wherefore, as all Carkases do not putrifie alike, so their bellies swell sooner or later, more or less: But while life endures, no rottenness or dissolution of particles is made in an animated body, that can bring about a splanchnick fermentation or swelling. In the mean while we deny

Why the belly swells in the dead.

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deny not, that winds are generated within the offices of concoction, ſanguification, and ſeparation, yea within all the particular cells and receſſes of our whole body; notwithſtanding from them all, unto the winds whereſoever engendred (whilſt the Spirits have their due influence, and actuate the nervous as well as moving fibres, that the ſides of the bowels be not kept diſtended and rigid) an eaſie vent does every where lye open. And the truth is, in a Tympany, we allow the wind to fill up the empty ſpaces, but the ſpirits, inaſmuch as they extend the bowels by their irregularity, do firſt cauſe thoſe vacuities, (wherein the winds ſecondarily and conſequently are engendred) and they (inaſmuch as the ſame bowels are ſtill kept ſtrutted and diſtended) do hinder thoſe winds from being removed.

The Animal Spirits and not wind the cauſe of the Tympanie.

And now I judge it is plain enough by what we have ſaid, that the animal ſpirits rather than the wind do raiſe ſwellings of the belly in that ſort; at leaſt ſuch ſhort and tranſitory ones, as happen in Hyſterical and Colick fits. Notwithſtanding there yet remains a great difficulty, after what manner the Tympanitical ſwelling of the Abdomen, which is fixt and permanent, yea for the moſt part immoveable, can proceed from any ſuch cauſe; eſpecially, becauſe the Animal Spirits being of their own nature active and very apt to motion, do for the moſt part ſo affect removal, that unleſs they be wearied or become defunct, they ſcarce ever lie ſtill.

That I may looſen this knot by reaſoning, it becomes us to conſider the Nervous Juice together with the ſubſtance of the Animal Spirits, which is every where a vehicle to them, and alſo a bridle: for the Spirits enjoying the moſt ſubtile ſtream thereof, do freely expatiate, and leſt being diſſipated from one another, they might fly away, they are contained in an entire ſeries. When therefore that Juice is faulty as to its temper or motion, immediately the animal ſpirits become diverſly delinquent, or are preverted in the exerciſes of their functions, as we have at large expounded in our Treatiſe of Paſſions. And leſt by repeating them now I ſhould make long Preambles, I will contract into a few words what belongs to the preſent purpoſe.

This happens by the fault of the Nervous juice.

Wherefore in the firſt place, it is to be obſerved, that the contents of the nether belly (excepting only the Liver, Spleen, and Kidneys) are furniſhed with many membranous bowels, (which the nervous fibres for the moſt part weave together) whence it follows that the nervous Juice (whoſe journey is longer, and the paſſages ſtraiter in theſe parts) doth find here many remora's: which alſo may be proved from the effect, foraſmuch as the convulſive invaſions, every where ſtirr'd up in the Hypochondriack Colick, Nephritical and Hyſterical Paſſions, do ſo grievouſly infeſt the Abdomen. When therefore that Juice watering the nervous fibres of theſe parts, ſhall be either viſcid or tenacious of it ſelf, or fill them with very many feculencies, for that cauſe it will come to paſs, that all the animal ſpirits will not eaſily return from thence as oft as they are hurl'd into theſe fibres, in ſome part obſtructed: and when in this manner there is a full incurſion, and a ſmall return of them, at length it will happen that great abundance of the ſpirits remain in theſe fibres every day more and more impacted, and hold them alwayes diſtended and very much pufft up; and at length by reaſon of the ways of their ingreſs and regreſs in thoſe fibres being obſtructed, they become immoveable in that place, and keep the affected parts always extended and ſtiff: in the mean time becauſe theſe Spirits there impacted within the nervous paſſages, and cramm'd thick, have commerce with others that flow to them in their dens, therefore the affected part although it be ſtiff and almoſt immovable, yet however enjoys ſenſe. This Pathologie although it may ſeem to ſome a Paradox, and uncouth, I doubt not but it will deſerve aſſent from many, if it be throughly weighed, that thoſe who have been a long time obnoxious to Hypochondriack Colick, and other convulſive diſtempers of the nether Belly, do at length become ſick of a Tympany.

By the obſtruction whereof the Spirits within the fibres are detained and made immovable.

The formal reaſon and conjunct cauſe of a Tympanie being delineated after this manner, before we proceed to trace out diligently the more remote cauſes thereof, it may be lawfull for us from what we have ſaid to deliver a definition, or at leaſt a certain deſcription of this diſeaſe, viz. *That it is a fixt and conſtant Tumour of the Abdomen, equal, hard, ſtiff, and yielding a noiſe upon ſtriking, taking its origine from a convulſive inflation of the parts and membranous bowels, by reaſon of the Animal Spirits being driven into thoſe fibres in too great abundance, and through the fault of the nervous juice obſtructing, being hindred from their return back; to which diſeaſe conſequently an accumulation of winds in the empty places, accrues as a complement.*

A deſcription of the diſeaſe.

Its procuring cauſes.

As to what appertains to the procuring and evident cauſes of this diſeaſe, it very ſeldome happeneth that they are altogether obſerved, bnt that inſinuating it ſelf by ſilent beginnings, it frequently is finiſhed, or becomes deplorable before it is perceived; inſomuch that againſt this diſeaſe ſcarce any antidote can be appointed; for while the ordinary functions are not much prejudiced, the ſwelling of the belly is preſumed

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presumed only to have its origine from wind, and while it is expected to vanish spontaneously, it often grows into a Tympanie. Wherefore that we may have timely notice of its beginning, we may take notice, that some previous affects dispose to it; of this sort is first an Hypochondriack, Colical and Hysterical disposition, yea and sometimes an Asthmatical; whose fits when they are used to be frequently raised, if at length a tumour of the Abdomen follow it, though it be small in the beginning, a Tympany forthwith may be feared. Of the former of these affects cases every where are to be met with, and stand fair to common observation: of the later *Scherichius* reports, *That a man of Sixty years of age was infested with this symptome some months before his Belly was swell'd into any manifest tumour, that as often as he sate at meat, beginning to eat, also when composing himself for sleep, he began to sleep soundly, he was surprized with such a difficulty of breathing, that the frequency of it threatned the danger of choaking; at which time also he perceived a certain palpitation about the Hypochondria, as if some living Animal were underneath the midriff; this distemper afterwards ended in a Tumour of the Abdomen, by which he died.* In this and others cases now cited the same reason holds, *viz.* that the animal spirits being used to make irregular excursions into the nervous Fibres of the lower belly, at length do not only more often and abundantly enter into them, but being impacted and hindred they abide in them, and so at length induce tympanitic inflations of the bowels. Truly this morbific beginning happens sooner or later, if thereupon do come the evident causes, which disturb the Spirits in the bottom of the belly, and compel them to frequent disorders, and also do either stop the motion or prevert the temperature of the nervous Juice flowing within those Fibres; in which rank are accounted irregularities in the six Non-naturals, immoderate Passions, and chiefly of grief, and usual evacuations suppress'd, drinking of cold water after some great heat, or any sudden cold induced on the belly, either from air or water.

Other previous convulsive affections.

The case of an Asthma ending in a Tympanie.

The evident causes of this disease.

As to the Prognosticks, this disease is always accounted of so bad an omen that commonly the name is abhorr'd, insomuch that frequently when there is no suspicion of ill from the tumour of the belly, if perhaps that swelling be call'd by the Physitian, a Tympanie, forthwith it is concluded desperate. Notwithstanding this Disease rarely kills of it self, but being protracted a long space of time, that it may at length more certainly kill, it gains to it self an Ascites, as an Harbinger of Death. That we may search into the reason thereof, it will be obvious enough to conceive, while all the bowels are distended in the lower belly, and are held as it were stiff, the passages of the blood, and nervous and lymphatic humours, being too much extended, or compressed are much straitned, and for that cause cannot freely and readily transmit its Juice; from whence it follows that every humour being straitned in the passage, that at length it may pass by some means, it shakes off a certain serosity from its mass wherever way is given; and those droppings of the humours falling into the hollow of the Abdomen, excite an Ascitick Dropsie.

The Prognosticks thereof.

What relates to the Curatory part of this Disease, the whole scope of healing is commonly bent against wind, *viz.* Indications inculcated by practical Authors suggest the matter to be evacuated, from whence the winds are raised, and to remove the cause that lifts them up, and the winds to be discuss'd and dissipated, which do already distend the belly.

The Cure.

For these ends Purgers appointed against the humour chiefly suspected are wont to be prescribed with great confidence, although with small or ill success; that is to say, Phlegmagogues so called, another while those that purge Melancholly, another while those that purge Choler, whereto also are joyn'd purgers of water (as weapons intended against every enemy.) For this disease (as is manifest by our observation) is wont for the most part to be exasperated with strong Purgers, and seldom alleviated; the reason whereof is evident enough, because the nervous fibres being provok't by a sharp Medicine, the animal Spirits renew their irregular excursions, and do every where more and more stretch them out, rather than give any remission to them; wherefore, although frequent and abundant watery and flatulent stools are procured, notwithstanding the Belly swells the more. Moreover, to dispell, discuss, and bridle the wind, there is a more than Æolian power prescribed; Medicines commonly call'd *Carminatives*, almost of every kind or form are sedulously administred, within and without, above and beneath, and upon the part affected; notwithstanding this disease for the most part is untamed by all these; whence we may suspect, that the true cause of the disease lyes as yet conceal'd, because Medicines profit not that are administred, indicated or suggested according to the ordinary Ætiologie or reason of it.

Remedies designed against Wind profit not.

Although

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Although I cannot challenge a better ſucceſs in curing this diſeaſe, or a more certain method of healing, atteſted from experience, notwithſtanding in the mean while we will here proffer another way of curing, accommodated to our Hypotheſis, and eſtabliſhed by reaſons ſtrong enough.

3. Curatory Indications.

Wherefore in a Tympanie, as in moſt other affections, there will be three chief indications; Whereof the firſt, and chiefly inſiſted on, is the Curatory, that by recalling the Animal Spirits from their Convulſive affection, and reducing them into order, endeavors the removal of the ſwelling of the Belly. The ſecond preſervatory which reſtrains thoſe or other Spirits from their irregular excurſions into the lower Belly, and together corrects the faults of the nervous liquor, watering it, both as to its temper, or motion. The third Vital, by removing the Symptoms urging, doth ſuccour and ſuſtain all the functions oppreſſed or weakened, as much as poſſible may be.

The firſt Indication hardeſt.

I. The firſt Indication is of greateſt moment, on which the hinge of the whole Cure turns; but it is moſt difficultly performed, for it doth not eaſily appear by what remedies or ways of adminiſtration it ought to be attempted, when moſt weapons or medicines do little or nothing prevail againſt this inviolable enemy. Phlebotomie aſſumes no place here, but is declined for the moſt part as prejudicial; alſo Catharticks, inſomuch as they provoke the affected Fibres, and diſturb the Spirits, and hurry them more impetuouſly, do increaſe rather than diminiſh or cure the Tumour of the Belly, in like manner Diaphoreticks impell the Spirits, and the morbific Particles deeper into them, whereas they ought to be allured, and call'd out of the Fibres. The chief order of healing ſeems to be placed in Diureticks and the uſe of Clyſters; and alſo great things are expected from topical Applications, becauſe they are more immediately exhibited to the diſeaſe, and as it were by contact, and becauſe they do beſt diſcuſs Tumors in other places. Yet not all Diſſolvents are here fitting, nor thoſe which profit moſt in other Tumours; for the more hot being given for diſcuſſing, whether they are applyed by Fomentation, Liniments, or in the form of a Cataplaſm or Plaiſter, oftner afford hurt than ſuccour in a Tympanie; for they both open and dilate the paſſages of the Fibres, that from thence they may lie more open to the incurſion of the Spirits; and alſo rarifie the Particles impacted, ſo that while they occupy a larger ſpace, an inflation and intumeſcency of the Belly is augmented. Laſtly, what appertains to Alteratives which ſuccour againſt other affections of the nervous kind, only a certain few are fit in a Tympanie; for where the morbific matter ſticking within the ſtraiter paſſages cannot be impell'd ſtraight or throughly, Elaſtick medicines render the ſtoppage greater and more fixt, by enfixing the matter deeper; wherefore Spirit of Harts-horn, of Soot, of Sal Armoniack, yea alſo Tinctures, Elixirs, and other Medicines endowed with a volatile Salt, or active Particles of another kind, do not only acquire heat, and a troubleſom thirſt in the ſick Perſon troubled with a Tympanie, but alſo cauſe the Abdomen to ſwell the more, inaſmuch as they melt the blood and nervous Juice, and ſtirr the Spirits, inſomuch that the Particles depoſited by each of theſe, are compell'd in the parts affected.

What, and what ſort of Medicines are good or hurtful in this Diſeaſe.

Only mild Purgers and Clyſters are convenient.

But truly although Medicine doth ſo little avail againſt this diſeaſe, it is not altogether to be neglected, (as if either it affected nothing, or what is ill,) but it behooves us to turn every ſtone, that by ſome means we may ſuccour the Patient, and at length may obtain a cure for him, or at leaſt an alleviation. Wherefore in the firſt place (becauſe it is the cuſtom to begin with Purgatives) although the ſtronger do ever hurt, and the gentler ſcarce ever prevail to diſcharge the conjunct cauſe, notwithſtanding theſe latter, inaſmuch as they do ſomething ſubſtract the nouriſhment of the diſeaſe, alſo make a way by which other Medicines do exert their powers, they ought to have their turns in Phyſical practice once in ſix or ſeven days; and at the other times let Clyſters (whoſe uſe is much better) be frequently adminiſtred. Hydroticks being prohibited, we muſt reſt upon moderate Diureticks, whereto are adjoyned things reſpecting the alteration and reduction of the Spirits and Humours, which truly make up the Tympanitical Pharmacy. Moreover in the mean time the uſe of Topicks is not to be neglected. We will annex certain ſelect forms of Medicines appropriated for every of theſe purpoſes. For a Medicine mildly ſolutive, let the laxative Wine be uſed, preſcribed by the renowned *Greg. Horſtius* for a Tympanie, in his Book of Obſervations, *lib.* iiij. *Chap.* xxx. or in its place let the following be preſcribed with greater eaſe.

Forms of Medicines.

A ſolutive liquor.

Take the leaves of Peach-flowers, of Damask-roſes, of each two Pugils, Broom, Elder, Centaury the leſſer, of each Pugil. 1. *the leaves of Agrimony, Roman Wormwood of each one handful, Senna one ounce, Rhubarb ſix drams, Carthamus-ſeeds half an ounce, Dwarf-Elder two drams, yellow Sanders three drams, Galangal two drams, ſlice them and bruiſe them,*

them, put them into a silk Bag in a Glass, with two pound of White-wine, Saxifrage-water, one pound, Salt of Tartar one dram and a half, let them stand 48 hours, let the Patient drink four ounces to six, every third or fourth day. PHAR. Part. II.

In a hotter Constitution let the following form be taken, which I have proved with success in this disease.

Take of purging Mineral waters eight pound, Salt of Wormwood two drams, let it evaporate in a gentle Bath to two pound. To this I use to add four ounces of Water distill'd from Purgers with Wine; the dose from four ounces to six.

Or to the two pound of evaporated water add of Mechoacan, Turbith, of each half an ounce, Rhubarb six drams, yellow Sanders two drams, Cloves one dram, digest them close and warm for two hours: filtre it through Paper, the dose 3 or 4 ounces.

Clysters are of frequent use in this Disease, inasmuch as they loosen the Belly without any great irritation of the Fibres.

Take of the infusion of Stone-horse dung with Cammomile-flowers a pound, Mellis Mercurialis two ounces. After the same manner Decoctions and Infusions are prepared, with Carminatives, from Dogs-dung. *Clysters.*

Take of the Emollient Decoction one pound, Sal Prunella, or Sal Armoniack from one dram to a dram and a half; make a Clyster.

Take of sound Urine one pound, Sal Prunella one dram, Venice *Turpentine dissolved with the yolk of an Egge, an ounce and a half: make a Clyster.*

2. Diureticks if any other Remedies promise help in this Disease. *Diureticks.*

Take of Millepedes living and cleansed three ounces, one Nutmeg sliced, bruise them together, and pour upon them one pound of the Diuretick-water prescribed below: Press them strongly, the Dose from three ounces to four twice aday.

Take of green Juniper-berries, and Elder-berries, of each six pound, of Firr-tops four pound, green Walnuts two pound, Cortex Winterani four ounces, the outer Rinds of six Oranges and four Limons, Seeds of Ameos, Rockets Cresses, of each an ounce and half, Dill-seeds two ounces, slice them and bruise them, and add of Posset-drink made with White-wine 8 pound, distil it in common Organs let the whole liquor be mixed. *Distilled Waters.*

Take of Crystal mineral half an ounce, Volatile Salt of Amber, two drams, the powder of Carrot-seeds one dram, Turpentine of Venice *what suffices to make small Pills, the dose Numb. 3. in the evening and morning, drinking after it three ounces of the distilled water.* *Pills.*

Take of the sweet Spirit of Salt half an ounce, take six drops to twelve, twice in a day, in a draught of the same water, with a spoonful of Syrup of Violets. *Spirits.*

Take of spirit of Salt of Tartar one ounce, take one scruple to half a dram, twice aday, after the same manner; So also spirit of Nitre, and Tincture of Salt of Tartar may be taken. *An Expression.*

Take of Plantane, Chervil and Clivers-leaves, of each four handfuls, bruise them, and pour on them a pint of the former distilled water. Press them strongly, the dose three ounces, twice or thrice in a day with other Medicines.

Take of Grass-roots three ounces, of Butchers-broom two ounces, Chervil and Eringo candied, of each one ounce, shavings of Harts-horn, Ivory, of each two drams, of burnt Harts-horn two drams and a half, Burdock-seeds three drams, boyl them in three pound of Spring-water to two pound, in it strained hot, infuse the leaves of Clivers, Water-cresses, bruised, of each one handful, adding of Rhenish-wine six ounces, make an infusion close and warm for two hours, after strain it again, and add of Magistral-water of Earth-worms two ounces, Syrup of the five opening Roots an ounce, and a half. Make an Apozeme, the dose four ounces twice aday, with some other Medicine. *Apozems.*

While these are taken inwardly, also Topicks and outward Applications may be carefully administred; not those which are hot and discussing, but those which are endowed with Particles of a volatile Salt, and Nitrous, to wit, those which destroy the Combinations of other Salts, and dissolve the impactions of the Spirits, for which we propound the ensuing things. If Fomentations ought at all to be admitted into use, let not them be not applyed too hot, also let them be prepared not of those that are usually call'd Carminative, but chiefly of Salts and Minerals. *Cabrotius* (cited by *Helmont*) *Topicks.*

PHAR. Part. II. *Helmont*) ſays, *That he cured one of* 80 *years of age, whoſe Belly he fomented twice aday with a Lye, in which he boyled Salt, Alum and Sulphur, and after applyed Cow-dung for a Cataplaſm.* I uſe to preſcribe theſe enſuing.

A fomentation. *Take of flowers of Sal Armoniack one ounce, Cryſtal mineral two ounces, Spirit of Wine ſmall and imbued with much Phlegm two pound, mix and diſſolve them in a glaſs.*

Let a woollen Cloth dipt into this warm be applyed upon the whole Abdomen, and then let it be changed, wetting it again; let it be done for the ſpace of half an hour twice aday, afterwards let there be applyed a Cataplaſm of Cow-dung, with the powder of Dogs turd, or the following Plaiſter.

A Plaiſter. *Take Empl. Diaſaponis, that is,* de Minio, *with* Venice *Soap, let it be ſpread thin upon limber Leather, and applyed to the whole Belly, to be renewed once in ten or twelve dayes.*

The ſecond Indication. II. The ſecond *Indication* requires moſtly alterative Remedies, to wit, thoſe which ſtop the fermentations of the humours in the bowels of the nether Belly, and the Orgaſms and irregular excurſions of the Spirits, alſo thoſe which procure equal mixtions and due motions of the Chyle and nervous Juice: for which end Chalybeates are chiefly in uſe. And truly it is wont not only in this, but in many other ſplanchnical Diſeaſes, to have reſort to the Medicines of Iron, as if from thence to fetch the ſharpeſt weapons; when as many Empiricks and Quacks, who preſcribe theſe things confidently and dogmatically, obſerve not by what way ſuch a Medicine doth operate, or what alterations for the better may be lawfully expected from thence: wherefore, while Iron, changed into Medicine, although the Sword of *Goliah*, is ſnatcht and brandiſht by a blind man, it is no marvel if it prove in vain, or if in the ſtead of the diſeaſe, which is an Enemy, Nature it ſelf is ſometimes hurt; and truly frequently it happens ſo, when Chalybeats, of which there is great variety, and diverſity of operations, are adminiſtred without any choice or difference either of the temperament or conſtitution in the Patient, and reſpect to the ſtate of the Diſeaſe.

Of Chalybeate Medicines.

What preparations of Iron are not convenient. Of Medicines prepared of Iron or Steel, and of their vertues and manner of working, we have in another place treated, and there is no need here to repeat the ſame things. For this diſeaſe, if any of them, not all of them are fit; for thoſe in which the frame of the mixture being opened, the Sulphur remains ſtill, and being looſened predominates over the reſt, they are altogether to be excluded from this number; for they do much ferment the Juices of the bowels with their notable fermentation, and do ſo exagitate the Blood and Spirits, that the whole Region of the nether Belly is lifted up into a greater bulk, as if by a certain Spirit thronging violently into it.

Neither here are they fit, from which the ſulphureous particles together with the ſaline are chaſed away, as in *Crocus Martis* prepared by long and ſtrong Calcination. For this Medicine as it is conducing to ſtop all fluxes, rather fixes any impaction of Humours and Spirits, and renders them more obſtinate.

What ſort may be admitted. But there remains a Martial Remedy of a middle kind, wherin the Sulphur being wholly or for the moſt part expell'd, a vitriolic Salt remains and predominates: as indeed it is in the ſolution of the filings of Iron, or in a ſimple Infuſion, or Mineral water, in the Salt or Vitriol of *Mars*, in our preparation of Steel, with many others; out of which medicines, being prepared or compounded, we find by often Experience that in ſome caſes, they contribute notable help. For theſe deſtroy the exotick ferments of the bowels, and reſtore the native ferments; they open their obſtructions, they fix the blood, and reſtrain its conſiſtence from too much diſſolution; wherefore Chalybeat remedies, after the ſame manner as certain other alteratives, do perhaps ſomething profit againſt the procatarctick, and more remote cauſes of a Tympany; but as to the conjunct cauſe, they contribute little or no ſuccour.

Forms of Chalybeates. *Take of our Steel finely prepared two drams, the diſtilled water above preſcribed two pound, Syrup of the five Roots two ounces, mix it in a glaſs; let it clarifie by ſetling, the doſe three or four ounces, in the morning, and at five afternoon.*

Take of the Powder of Aron-roots, Crabs-eyes, of each three drams, Cryſtal Mineral two drams, Vitriol of Mars *a dram and a half, Sugar of Roſemary-flowers two drams, mix them, the doſe half a dram twice in a day with a convenient vehicle.*

A liquor of the flowers of Tapſus Barbatus. *Hartman* doth wonderfully magnifie the liquor of the flowers of *Tapſus Barbatus* or Mullein, as a ſpecifick remedy in this diſeaſe, by putting the freſh flowers into a Veſſel

Veſſel, being ſtrongly preſs'd, and put into an Oven with bread being cloſe ſtopt, afterwards the Liquor being ſtrained, let it be diſtill'd *in Balneo*, the doſe one Scruple in the Decoction of Fennel-ſeeds and Roots. Surely this Medicine, if it doth effect any thing, ought to be given in a larger doſe. PHAR. Part. II.

Johannes Anglus commends an Electuary of *Roſata Novella* with *Diatrion Santalon*, and *Eggs of Ants*, which remedy ſeems to promiſe ſomething probable enough. In imitation of this I here propound this enſuing.

Take Conſerve of Chichory flowers, of Indian Creſſes, of each three drams, powder of Aron-roots, Lignum Aloes, yellow Sanders, of each one dram, Crabs-eyes one dram and a half, Salt of Wormwood one ounce, Ants Eggs one ounce, the liquor of Tapſus Barbatus half a dram, with a ſufficient quantity of Syrup of Citron-rinds make an Electuary, the doſe two drams twice in a day, drinking after it of the former diſtilled water, or of the following Julep three ounces. *An Electuary.*

Take the water of the leaves of Aron, of the Juice of Elder-berries, of the water of Juniper and Elder-flowers, of each ſix ounces, the magiſtral water of Snails, and of Earth-worms, of each two ounces, Syrup of the Juice of Elder-berries two ounces, mix and make a Julep. *A Julep.*

III. The third Indication Vital preſcribes Remedies againſt fainting of Spirits, and difficult breathing, and againſt Watching and Thirſt. We will briefly annex certain forms of either kind. *Third Indication.*

1. Cardiacks.

Take of the water of Napha, *Marygolds, Camomile, of each three ounces, of Dr.* Stephen's *water two ounces, Tincture of Saffron two drams, Sugar one ounce, Pearls one dram, make a Julep, the doſe four or five ſpoonfuls three times aday or oftner in faintings.* *Cordials.*

Take Conſerve of Marygolds two ounces, Confection of Alchermes, and de Hyacintho, *of each two drams, prepared Pearl one ounce, ſyrup of the juice of Citrons, enough to make a Confection, take the quantity of a Nutmeg evening and morning, drinking after it a draught of the Julep.*

2. Hypnoticks.

Take of Aqua Hyſterica *ſix drams, ſyrup* de Meconio *half an ounce, mix them, and take late at night.* Or, *Hypnoticks.*

Take of ſmall Cinnamon-water one ounce, Diacodium three ounces, Tincture of Saffron two drams. Mix them, and take one ſpoonful at night, if ſleep be wanting. Or,

Take ſyrup of Cowſlip-flowers three ſpoonfuls, compound Pœony-water one ſpoonful, Laudanum tartarized one dram, take one ſpoonful, if Watchings require it.

3. Extinguiſhers of Thirſt, in this Diſeaſe being very thirſty, ought frequently and in ſmall quantities to be adminiſtred, that that troubleſome ſymptom may be reſtrained without much drink, which is perpetually pernicious. For which purpoſe, *Things mitigating Thirſt.*

Take of Conſerve of Wood-ſorrel paſſed through a Sieve three ounces, Pulp of Tamarinds two ounces, Sal prunella one dram, with a ſufficient quantity of ſyrup of the juice of Wood-ſorrel, make a Lohoch, of which let him lick often.

PHAR. Part. II.

SECT. II. CHAP. V.

Of an Anaſarca.

NOw two kinds of Dropſies, *viz.* Aſcites and Tympanie (according to common reckoning) being finiſht, although the third, to wit an *Anaſarca* (for that it is an affection rather of the whole body, than of the nether Belly) appertains not properly to this place, notwithſtanding the Pathologie thereof having ſome affiance with the former, we think fit to deliver here alſo its Cure in ſhort. An Anaſarca is deſcribed after this manner, *That it is a white ſoft Tumour of the whole outward Body, or of ſome of its parts, yielding to the touch, and leaving a dent upon compreſſion*, proceeding from a watery humour extravaſated, and accumulated as well within the interſpaces of the Muſcles, as within the pores of the fleſh and skin, yea of the Glandules and Membranes.

The deſcription of an Anaſarca.

It differs from an Aſcites as to its outward form and appearance, yet not as to its morbific matter, which being the ſame in both diſtempers, as it is heaped within the greater or leſſer hollowneſſes, it gains divers Appellations of the Diſeaſe.

How it differs from an Aſcites.

The watery humour procuring an Anaſarca, doth proceed altogether or for the moſt part from the blood; for it being continually produced within the maſs of blood by the fault and defect of ſanguification, it is poured out in greater abundance from the extremities of the Arteries, than can be received, or brought back by the Veins, or the Lymphaducts, or can be diſcharged by the Reins or pores of the skin, and other vents of the ſerous Juice.

The Original from the blood.

From theſe it follows, that the material cauſe of this Diſeaſe is a watery humour, and the efficient is blood, which engenders waters and depoſits them in the places affected. We will exactly weigh the reaſons of either of them, and the manner of becoming and effecting it, and firſt we will treat of the efficient Cauſe of an Anaſarca.

The material and efficient cauſe.

1. The affection of the Blood, or rather the Hydropical brood, conſiſts in theſe two things, to wit, Firſt by reaſon of a failure or fault of ſanguification, it doth not rightly aſſimilate the nutritious Juice perpetually infuſed into its maſs, but ſuffers it to degenerate into a watery humour: Then ſecondly by reaſon of the too looſe mixture thereof, it doth not retain that humour, ſo degenerated, ſo long within its conſiſtence, until it might be diſcharg'd through fit Emunctories or Emiſſaries, but lets it out every where near to the ends of the Arteries, into the inter-ſpaces of the Veſſels, and there leaves it. Either of theſe vices of the Blood we will conſider a little more.

The Blood its efficient cauſe in a double reſpect.

In the firſt place as to the former, for the moſt part it is confeſſed by all, that the Blood it ſelf and not the Heart or Liver ſanguifies, by what of late is plainly underſtood concerning the functions of theſe parts; yet by what means the Blood aſſimilates Chyle infuſed to it ſelf, and converts it into freſh blood, to be beſtowed to ſo many and diverſe ſorts of uſes, doth not eaſily lie manifeſt to us. But what ſome affirm, that it is made only by the exact comminution and commixtion of particles, and for that cauſe the particles of either kind being confuſed together, they think, that within the ſtraiter paſſages of the Liver and Lungs they are kneaded and wrought together as it were with little peſtils, ſeems little probable to me; but on the contrary, I think theſe bowels (as I have ſhewed already) are conſtituted the Organs rather of ſeparation than of mixture; but the reaſon of ſanguification altogether conſiſts in this, that the active particles of the old blood, to wit, the ſaline and ſulphureous, being placed in vigour with the ſpirituous, immediately act upon the like particles of the infuſed Chyle as yet exiſting in an inferiour ſtate, and do ſo ſtir them up and ferment them that thereupon being extricated from the coverings of the thicker parts, they are carryed into a like degree of exaltation or perfection with the former, and being at length aſſociated with them, and made alſo homogeneous, they put on the ſame nature of Blood; the more thick and heterogeneous particles being removed thence to another place, from thoſe which they had deſerted and gone away from. For truly Sanguification is altogether finiſht by Fermentation, even as the maturation of the Muſt into Wine or Ale; but the reaſon of the difference is, that Wine being ſhut up in the Tub, ſtill remaining entirely in the ſame Maſs, is ſlowly fermented, as to its whole

Firſt that it doth not rightly ſanguifie.

The reaſon whereof enquired into.

whole conſiſtence, and is not accompliſhed but in a long ſpace of time; but the Blood conſtituted in a perpetual flux by the loſs of ſome parts and the reparation of others, is fermented by the parts ſtill received freſh, and is generated anew.

The reaſon and manner of ſanguification explained.

The old Blood for the moſt part affords the ſame thing towards the freſh Chyle, as Ferment from the flower or fæces of old Ale, being put into new Ale; notwithſtanding as it were by a contrary manner; becauſe the huge maſs of blood being formerly fermented, doth ſuddenly ferment and alter the ſmall portions of the Chyle continually brought in; but the fermenting liquor in Ale in a very little quantity is put to the great maſs of the other liquor to be fermented; which it brings not to maturity under a long ſpace of time. After the rudiments of blood are ſo caſt by fermentation, the concluſion and perfect aſſimilation, into blood, is acquired by accenſion; (for ſurely that it is ſo enkindled (as I think) I have formerly ſhewed by demonſtration which arguments chiefly taken from its proper paſſion, although many have cavill'd at, none have been yet able to overthrow.) Wherefore, while the whole maſs of blood conſiſts of Blood and Chyle confuſedly mixt together, it is fermented while it is circulating; and being divided into moſt minute portions, is ſpread through the whole Lungs, that it might be kindled ſucceſſively according to all its parts, by the nitrous air ſuckt in: for by that means both the vital flame is continued, and all the particles of Blood having as it were paſſed the fire, become more purified, and more agreeable among themſelves; moreover, they are ſo diſpoſed of whileſt they are kindling, that while ſome go into Nouriſhment of the Spirits, of the Nervous Juice and the ſolid parts, and others leſs uſeful depart into the ferments or recrements of the bowels; mean while others being more fixt, abide longer in the maſs of blood, and ſuſtain its conſiſtence, and by fermenting the Nutritious Juice, ſtill engender new Blood, until themſelves being impoveriſhed, are at length diſcarded, and give place to others that are freſh and luſtie.

An Hydropick temper of the blood ſprings from a double reſpect.

Having ſhewed after this manner by what courſe Sanguification ought to be finiſhed, as well by fermentation as accenſion of the Blood; it will be eaſie to conceive wherein the fault conſiſts producing an Hydropick diſpoſition: To wit, this uſually aſſumes its riſe whenſoever either or both thoſe Conditions requiſite to Sanguification either fail, or are preverted.

Viz. Firſt from the defect or fault of its Fermentation;

Firſt therefore this happens more frequently and rather, for that the blood being depraved in its temperature, doth not rightly ferment the Nutritious Juice poured into it, that ſo it might be changed into laudable blood. For when the watery particles predominate with the earthy in the maſs of Blood, the Salt and Sulphur being depreſſed with the Spirit, as all the functions, both Vital and Animal, from thence languiſh and waver, ſo eſpecially Sanguification it ſelf fails and is perverted. For the Juice of the Chyle commixt with the Blood, when it cannot be diſſolved and fermented, with the particles thereof, (after the faſhion of other liquors, as often as being mixt they want ferment,) it degenerates perhaps into a watery, acid, or ropy, or otherwiſe faulty humour, which being afterwards daily encreaſed, and at length riſing to its fulneſs, lyes heavy on the blood, and oft-times almoſt ſtifles its heat; from whence there is a neceſſity that it be forthwith diſcharged by ſome means, and whereſoever it can get vent; but afterwards for that the offices of ſeparation fail in their functions (the ſtock of the animal Spirits languiſhing by reaſon of the diminiſhed proviſion from the influx of Blood,) the abounding Serum is depoſited every where into the pores, and next vacuities whether greater or leſſer, out of the little mouths of the Arteries; from whoſe daily and great encreaſe, after all the pores are filled, ariſes that as it were fenny habit call'd *Anaſarca* of the whole body outwardly, or of ſome of its Members.

Secondly, from defect of Accenſion.

Secondly, not only the defect or fault of Fermentation, but alſo of the accenſion of the Blood, induces ſometimes an Hydropical diſpoſition on the maſs thereof: which is clearly diſcern'd, inaſmuch as ſome perſons inhabiting Maritime or Mooriſh places, fall into the Dropſie without any other cauſe or occaſion, than that they draw a thicker air endowed with heterogeneous vapours, by which the Nitre is either driven away or obſcured. Therefore the blood becoming degenerate, and vitiated as to its temperature, becauſe it is not duely kindled, nor perfected by efflagration within the Precordia, doth not rightly diſſolve and aſſimilate the Juice of the Chyle, but ſuffers it to be preverted into a watery liquor. But although in the firſt place, the blood being depraved for this reaſon, ſometimes loſes its fermenting vertue, and therefore the rather and more immediately procures a Dropſie; notwithſtanding it is manifeſt, the firſt fault thereof aſſumes its origine from unwholſom air ſuckt in, and not duely enkindling the Blood; becauſe ſuch Hydropicks removing their reſidence into Sunny and Mountainous places, recover their health without any other Medicines.

Hitherto

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Hitherto of the neareſt Cauſes of an Anaſarca and which are conjoyned to the Diſeaſe it ſelf, which namely are the depravation or defect of the maſs of blood, chiefly as to its fermentation, and in ſome meaſure as to the enkindling thereof; which latter is ſcarce wont to be effective but when it follows the former: but what remains as to the more remote and procuring cauſes of this Diſeaſe, to wit, from which the defermentative affection ariſes (that I may ſay no more of the defect or depravation of its enkindling;) I ſay that theſe appear ſo diverſe and many, that I judge it hardly poſſible to recite them all particularly; notwithſtanding, very many or at leaſt the chief may be reduced to theſe three heads: to wit, For that the watery diſtemperament of the blood doth ariſe, inaſmuch as its active Principles, *viz.* Spirit, Salt and Sulphur, are not inveſted with their fermenting and ſanguifying force or vertue, I account this to come to paſs, either Firſt becauſe thoſe particles are too much waſted by their great Expences; or Secondly becauſe they are not repaired by convenient and proportionate Refections; or Thirdly, for that they are overwhelmed or obſcured by ſome other duller or heterogeneous Particles being too much accumulated in the maſs of Blood: We will a little weigh the Reaſons and ways of each of theſe their coming to paſs.

Reduced to three heads.

In the firſt place, the former of theſe is evidently diſcerned in frequent and inordinate Hæmorrhages, whereby many men, although ſtrong and formerly healthy, are immediately enclined to a Dropſie, more than from any other accident or occaſion; the reaſon whereof is, that the blood is ſo impoveriſhed, through its more noble Particles iſſuing out in great abundance, that afterwards it can neither duly ferment nor enkindle the Juice of the Chyle brought into it. Moreover, ſometimes the ſame effect ſucceeds (although in a more ſlow degree) from Feavers and other long maladies and languiſhings; to wit, inaſmuch as the blood ſuffering under a long depreſſion, is ſo extenuated and robb'd, that at length it becomes watery and defermentative.

Firſt, becauſe the active particles of the blood, are too much conſumed.

Secondly, the Blood ſometimes deſerting its genuine diſpoſition, declines into an Hydropical one, for the nouriſhment being more ſlender than it was wont, or ought to be beſtowed upon it, its active and ſanguifying Particles are not enough repaired within its maſs; for ſo we have obſerved, that ſome who have uſed themſelves to Wine and ſtronger Drink, after they have been reduced to homely Diet, and ſmaller drink, of water or ſmall beer, ſuddenly have become Hydropick. It is a common obſervation, and frequently true, although of ill omen, that Drunkards, and daily drinkers, if that wild Cuſtom be left, at length becoming ſober and abſtemious, are much in hazard, leſt by reaſon of the uſual fermentation of the blood being depreſſed, they become obnoxious unto that Diſeaſe. I knew a notable Drunkard, who declared that a Prieſt very learned and Pious was guilty of his death, becauſe he gave him admonition to Temperance, and to leave his Drunkenneſs, and he complying therewith, incontinently fell into a mortal Dropſie.

Secondly, becauſe they are not enough repaired.

But the third cauſe or occaſion diſpoſing to that Diſeaſe, the moſt common and notable, conſiſts in this, that the active Particles of the Blood, being involved with other more dull or heterogeneous ones, or being diſſipated from one to the other, loſe their fermentative power, or cannot enough exerciſe it. But ſuch an affection of them, as it is wont to be raiſed from various cauſes and accidents, ſo chiefly from theſe three, one while ſolitary, another while united together; to wit, Firſt from the Non-naturals immoderately received: Secondly from the Naturals unduely retain'd; or Thirdly, from the Preternaturals corruptly generated in the body.

Thirdly, becauſe they are buried in duller particles.

Whereof there are three cauſes.

The errors of Diet deſervedly may be referred to the firſt rank of theſe (whereby the ſtock of that Diſeaſe is alwayes moſt abundant.) For it is a common Prognoſtick and in every bodies mouth, that Gluttons and great Drunkards dye at length of a Dropſie: to which moreover, not only Surfeits and immoderate and daily Tiplings incline, but alſo frequent and unſeaſonable Treats; and moreover the continual pouring in of abſurd and hard to be digeſted Nouriſhment. For from the evil courſe of Diet of each kind uſed any while, whenas the Juice of the Chyle, oftentimes crude, incongruous, and above meaſure plentiful, is poured into the maſs of blood; it of neceſſity follows, that it is firſt burdened, and afterwards its Conſiſtence being looſened, the more noble Particles being forced aſunder, it is ſo involved, or abated by the other heterogeneous ones, that being hindred, it deſiſts from its fermentative or ſanguifying virtue; inſomuch that the bowels being in a ſhort time hurt by its aſſaults, a Cachexia, and then a Dropſie follows, whereof that is always a forerunner.

Firſt from Non-naturals immoderately ingeſted.

Secondly, in this place are put all ordinary, accuſtomed and ſolemn Evacuations ſuppreſſed. It is obſervable enough, that a Cachexia, and often a Dropſie, doth ariſe from a menſtruous or Hemorrhoidal flux diminiſhed or ſtopt, no leſs than from

Secondly, From Naturals unduely retained.

from a too immoderate one, (by reaſon of the fermentation of blood impeded by the heterogeneity of Particles.) Moreover, the ſame is often wont to be affected from Iſſues ſuddenly ſtopt, or eruptions of the Skin ſuddenly repercuſs'd. Laſtly, ſuppreſſion of Urine, and ſweating much hindred, do render the blood more watery, by an immediate and neceſſary affection, and encline to the Dropſie. Alſo it is an obſervation frequent enough of healthful Perſons, who being compelled for ſome time to abſtain from going to Bed, that their feet have ſwoln.

Thirdly, From Preternaturals generated in the Body.

Thirdly, Preternatural things generated within the Body, but eſpecially Tumours and Humours do hinder the motion of the blood, or pervert its temper, and ſo induce an Hydropical diſpoſition. Tumours ſtirred up in ſome place about the Bowels, inaſmuch as they hinder or ſtraiten the circuit of the Blood, do cauſe its Serum to be there extravaſated, and poured out; by the accumulation whereof within ſome cavity, in the firſt place an Aſcites (as we have ſhewn above) and at length an Anaſarca, a conſequent of that doth frequently enſue. Moreover, Humours of divers ſorts being engendred in divers places within, and transferred into the blood, do firſt pollute the maſs thereof, and defile it with heterogeneous Particles, whereby at length it is ſo depraved in its temperament, that it perverts the Juice of the Chyle brought in (when it cannot further ferment and aſſimilate it) into an hydropical liquor. For this reaſon, nothing is more uſual than that Conſumptive perſons, and thoſe that are affected with ſtrumous and cancrous Ulcers, nay of any ſort within the Reins, Meſentery, Guts, or other Bowels of the lower Belly, after they have been long conſuming, dye at length hydropical.

Different manners hereof are reckoned.

The material cauſe of an Anaſarca is partly the Serum of the Blood, and partly the nutritious Juice.

Hitherto concerning the next efficient cauſe of this Diſeaſe, alſo of the chief remote ones, as well procuring, as evident. But as to what appertains to the material cauſe, it is obvious unto the Sence, that it is a meer Lympha accumulated within the pores of the Skin, and of the other outward parts; which being depoſited there by the blood (the liquor thereof being partly ſerous, and partly chylous Juice) but failing in Sanguification and Nouriſhment of the body, to which it was deſtinated, it is caſt of like recrements into the vacuous ſpaces of every veſſel. And though the matter of the Dropſie proceed from the Blood and Chyle, yet it is no wonder if it appear neither like blood, nor milkie, but only limpid; becauſe the Urine even of healthful people, after more plentiful drinking, is rendred crude as well as watery; and therefore it is manifeſt, it is nothing changed by the blood, but leaves in that place, whatſoever of colour or thicker conſiſtence it brings to its maſs. And although a reaſon may be given in either caſe, that the Urine, inaſmuch as it is ſtreined through the Kidneys, and the hydropic matter thorough the pores of the ſolid parts, even ſo become limpid and watery; notwithſtanding it is evident by obſervation, that the watery part of Chyle, even while it is confounded with the blood, is not intimately mixt with it, but being deprived of its colour and conſiſtency, it remains under the form of Lympha, within the pores of the blood; the ſure ſign of which is, that the blood taken from any Animal by Phlebotomy, after being cold it is divided into parts, exhibits a watery liquor (which conſiſts of Serum and Nutritious Juice) plainly limpid, and ſeparate from the other blood. It will be from our preſent purpoſe to enquire any further into the reaſons hereof, and manner of being ſo, and wherefore blood, which being poured into water doth preſently tinge the ſame, and bloodies all ſolid bodies whenſoever it is ſprinkled thereon, yet dyes the Serum of no colour with which it is intimately confounded and a long time circulated.

Why the hydropick humour is limpid and not milkie nor bloody.

The differences of the Diſeaſe.

From the Ætiologie of this diſeaſe now delivered, the differences of it may eaſily be collected; to wit, firſt it is either univerſal, when the whole habit of the body and all the members ſwell up: or it is particular, wherein for the moſt part the inferiour members only ſuffer, in the mean time the reſt of the body pining away for want of Nouriſhment, which kind of diſtemper, and not a Tympanic, *Proſper Martianus* will have *Hippocrates* ſtyle the dry Dropſie, in which what is reported of the Syren, the dry is joyned to the watery.

Secondly, an Anaſarca whether univerſal or particular, is either ſimple or complicated with an Aſcites; and then either an Anaſarca enſues an Aſcites, or this diſeaſe follows that. Moreover an Anaſarca may be diſtinguiſhed many ways in reſpect as well of the procatarctick as evident cauſes, as we have before intimated; and ſuch differences thereof are found to be frequently of great moment about duely inſtituting the Prognoſtick and Cure.

The Prognoſticks of it.

Wherefore, what relates to the prognoſtick part, this diſeaſe while it is ſimple, proves leaſt dangerous among all the kinds of Dropſies; and a particular one ſeiſing only the inferiour members, ſo that the belly doth not together ſwell with them, is much ſafer than an univerſal one.

And

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An Anaſarca bringing on an Aſcites, wherein for the moſt part the Urine is plentiful enough, and the thirſt not very intenſe, is far more ſafe than an Anaſarca brought in by an Aſcites, wherein the diſeaſed do very much thirſt, and make little, red, and thick, and for the moſt part a lixivial Urine. In like manner it is, or worſe, when an Anaſarca comes upon a Tympanie or a Phthiſis (as ſometimes 'tis wont.) Laſtly, no ſlight Prognoſtick of this diſeaſe is taken from the complyance, or the obſtinateneſs of the Patient, about Diet and Medicine. For whatſoever the condition of the diſeaſe may be, if the hydropick perſon refuſing medicine will indulge his fancy, we may not hope any good from thence.

The Cure of it. Two Indications.

About the Curatory part to be deſigned in order, two chief Scopes of Healing do occur, *viz.* Firſt, that the water between the skin be conſumed by ſome means; Secondly, then proviſion muſt be made, leſt it be continually generated and accumulated afreſh; for which purpoſe a Phyſitian is to emply his labour, both that the bowels of Concoction being emptyed of their Superfluities, and free from obſtructions, may always procure laudable Chyle, and ſupply the maſs of blood in due plenty; as alſo that the blood (the principles thereof being reſtored to its fermentative power) may orderly ferment the Juice of the Chyle continually poured into it and aſſimilate it into Blood. The vital indication ſeems not at all neceſſary in this diſeaſe as in many others, for that very rarely in this appear ſwoonings of the Spirits or Watchings, for which Cordials and Hypnoticks are required; and there is little need of reſtoring Diets, becauſe Faſting and Abſtinence rather help, and oft-times make up the greateſt part of the Cure: the reaſon whereof is, that the Veſſels being emptyed through want, do ſwallow up the waters between the skin, or ſtagnating in other places, and do diſcharge them forth partly by the Kidneys, by the pores of the Skin and other Emunctories, and partly do advantageouſly employ them being yet turgid with alimentary Juice, to the nouriſhing of the body.

The firſt intends the evacuation of the morbific matter.

Firſt, That the firſt, *Indication* being Curatory, intending an Evacuation of the morbific matter, may be performed, there ought to be exhibited all Hydragogue medicines, as well ſimple as compound; and alſo the forms of medicines recounted and preſcribed in the former Chapter of an Aſcites. Moreover, hereto belong not only Catharticks and Diureticks, but alſo Diaphoreticks, which though in other ſorts of Dropſies they are very much forbidden, often take place in curing of an Anaſarca.

By Purgers.

In a ſimple Anaſarca we may lawfully adminiſter ſtrong Purgers, and frequently they much profit. And truly this diſeaſe being cured ſometimes by means of a Cathartick, Empiricks do much glory of their Cures, and certain of their medicines become much cryed up for curing hydropical perſons; for if at any time it happens that they have healed one or two labouring with an Anaſarca, by their ſpecifick Hydragogues and Elateriums, it is enough wherewith they may always magnifie themſelves and their Art, although by the ſame medicine they have murdered a hundred Aſcitical perſons. Wherefore, although, Preparations of Spurge, or *Elaterium*, *Pilulæ Lunares*, *Hercules Bovii*, and other Hydragogues, have ſometimes profited in ſome caſes; notwithſtandiug if they be indifferently exhibited to all Hydropicks, or at all to any endowed with a weak Conſtitution, and Bowels of a brittle tone, or of evil conformation, they oftener cauſe death than remedy: wherefore let it always be committed to the judgment of a prudent Phyſitian, the time when, how long, and what ſort of Catharticks are to be uſed.

Strong Purgers are convenient, but not to all.

We have before deſcribed forms of Hydragogue Purgers of every ſort, to wit thoſe that exerciſe their power upwards and downwards, and as well mild as ſtronger workers, ſo that they may be referred hither, and accommodated to the method of healing now propoſed.

The manner of their working.

But if the reaſon be enquired, after what manner Purgers do operate in this diſeaſe, and why they more happily, and much more efficaciouſly bring out waters than in any other ſorts of Dropſie; I ſay, in an Anaſarca the morbific matter (which is the Lympha) ſubſiſts partly in the maſs of blood, partly in the habit of the body, within the pores and vacuities between the ends of the veſſels; wherefore, a ſtrong Cathartick being adminiſtred, preſently troubles and diſſolves the maſs of blood, and ſtirrs it up to the excretion of any ſuperfluous or heterogeneous thing; and irritates alſo the little mouths of the Arteries gaping towards the Cavities of the Inteſtines, that the humour ejected from the blood may eaſier find vent through theſe Emunctories. From hence in the firſt place, the waters fluctuating within the blood are abundantly drained out, afterwards the veſſels being emptyed, do preſently ſwallow up again the waters between the skin, and preſently diſcharge them forth partly by ſiege, and partly by Urine, or Sweat; in the mean time there is no fear leſt, as in an Aſcites, the morbific matter being driven and poured from the blood

blood, by the Medicine, ſhould be further forced into the places affected; whence not eaſily flowing back again, it ſhould be more largely increaſed; nor leſt, as in a Tympany, by reaſon of the Fibres of the Stomach and Guts being too much irritated by the Phyſick, thoſe bowels might be provoked into convulſive ſwellings. For as long as the bowels are firm and well conſtituted, the particles of the Medicine inflict them with no hurt; but preſently being brought into the blood, they do not only allure waters out of it, but by exagitating the maſs thereof, they raiſe the active particles formerly overwhelmed, and diſpoſe them towards their fermentative power.

Secondly, By Diureticks.

Secondly, Hydragogues working by Urine, as well ſimple as the compound, as alſo forms of Medicines prepared from either of them, and the manner of their adminiſtration, we have alſo deſcribed above, which alſo may be transferr'd hither to ſave repetition. But becauſe not all Remedies of this kind do help alike in all the Diſtempers, it is here obſervable, that for curing an Anaſarca *Lixivials* (as has been frequently manifeſt by our obſervation) do far excel other Diureticks. For indeed now it is a common and thredbare Remedy, for any one having ſwell'd members, after a previous Purge, to take twice or thrice in the day, from ſix to eight ounces of a Lye made of the Aſhes of Wormwood or Broom, made in White-wine, and to continue the uſe of it for ſome dayes. This Medicine moves potently the Urine, as I have obſerved in many, yea ſometimes in ſuch abundance, that piſſing the quantity of half a gallon in a day and a night, the Patients have recovered their healths in a ſhort time even to a miracle.

And chiefly Lixivials.

The reaſon and manner of their operation enquired into.

We have unfolded in a former Treatiſe, by what manner and faſhion Diureticks of ſeveral kinds do operate, and after what manner they affect the bowels, blood and other humours: But that in thoſe that labour under an Anaſarca, Medicines endowed with a fixt and lixivial Salt, expel Urine more than thoſe of an acid, alcali, or volatile Salt; the reaſon as I judge is this, *viz.* in thoſe affected with this diſeaſe, after the fermentation and ſanguifying vertue of the blood failing, the watery and crude humours heaped up as well in its maſs as in the habit of the body, do there remain almoſt immoveable for a long time, till at laſt they (as the manner is of watery Juices long ſtagnating) do wax ſoure; wherefore the lixivial particles of the Medicine ſpread abroad in the blood preſently boyl up with the acids of the waters, which while they ferment and move, they ſtir up in the whole maſs of Blood, a notable and excretive fermentation; inſomuch that all the particles being put into motion, not only the watery and ſuperfluous being thruſt from the reſt, are diſcharged by the Reins; but alſo the innate and active particles of the blood it ſelf, unfold themſelves from the more groſs with which they were involved, and laſtly riſing up, they begin to reſume their fermenting power, and to ſanguifie.

Forms of lixivial Diureticks.

Take of the Aſhes of Broom or Wormwood, or of the twigs of a Vine laccined to whiteneſs and ſifted, four ounces, put them into a glaſs bottle with a quart of White-wine, let them digeſt cloſe ſtopt and warm for three or four hours, after ſtrain it; the doſe from ſix to eight ounces twice aday.

Take of white Tartar calcined with Nitre, and after melted in a Crucible to blueneſs three ounces, ſmall Spirit of Wine a pound and a half, water of Snails and Earth-worms, of each four ounces, digeſt them in a Sand furnace for two dayes: the doſe of the clear liquor from two to three ounces, with four ounces of the decoction of Kneeholm and Burdock-roots in Ale.

For ordinary Drink:

Take of the white Aſhes of Broom cleanſed two pound, put them into a little Bag, with three ounces of Saſſafras, one ounce of leſſer Galangal, an ounce and a half of Juniper-berries, and as much of Carrot-ſeeds, make a bag for four gallons of Ale, after ſeven or eight dayes begin to draw it.

Diaphoreticks.

3. *Diaphoreticks* do often very notably help in a Leucophlegmatia (which is the commencing or declination of an Anaſarca) but in this diſeaſe confirmed, they are wont to be more convenient than in other kinds of Dropſies. And although from the beginning they cannot cauſe Sweats, by reaſon of the habit of body ſurrounded as it were with a more thick marſh, however while they exagitate the blood, they cauſe the innate active particles thereof, being before dormant, and half overwhelmed, to be raiſed up and diſpoſed towards fermentation, and alſo they cauſe all the excrementitious, and chiefly the watery, to be raiſed into motion, ſo that preſently flowing out of their Receptacles, they may the more readily and eaſily find way by ſiege or Urine, and oftentimes in ſome part by tranſpiration. But truly after the

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waters being poured out by purgation, the morbific matter is diminished so much, that the bulk of the body and the swelling of the members begin to abate, the reliques of the humour are best consumed by a moderate transpiration and constant sweating.

Diaphoreticks profit which are taken in a larger dose.

We have described before the number and forms of Hydroticks; as to the present purpose for curing an Anasarca, those chiefly are fit which are given in a larger dose; for they whose quantity is very small, their active particles being overwhelmed in the waters, are lost before being infused into the blood they can exert their strength. Wherefore, Spirits, whether armoniac or vinous, as also Tinctures and Elixirs, yea and powders, are more rarely used in this disease, because they effect little in a lesser dose, and if they be exhibited in a very large one, they often hurt the bowels by their outrage; But those things are rather chosen, which being taken hot, and in a full draught, are able to pass into the whole blood not weakned; of which sort, in the first place are Decoctions of Woods, and Roots, whose particles being agreeable enough to the Blood, and not to be tamed thereby, do pass through the whole mass thereof, and do exert their Elastic power by moving together all the humours.

Forms thereof.

Take of the Shavings of Lignum Vitæ six ounces, Sassaphras two ounces, of each of the Sanders six drams, shavings of Ivory, Harts-horn, of each three drams, let them be infused and boyled in eight pound of Spring-water to half; adding of Calamus Aromaticus, lesser Galangal, Burdock and Butter-Bur-roots, of each one ounce, the leaves of Sage, Germander, dryed, of each two handfuls, let the strained liquor be kept for use; the dose from eight to ten ounces twice in a day warm; to every dose may be added 20 *or* 25 *drops of Spirit of Sal Armoniac drawn with Amber, or of Spirit of Soot, or half a dram, or a dram, of Tincture of Salt of Tartar.*

External Hydragogues.

Hitherto of inward Hydragogue Medicines, which cause the Lympha to be drawn forth, either by alluring it inwards towards the guts, or by driving it forth to the Reins or pores of the Skin. Besides, there are certain outward administrations in use, by which the water accumulated within the habit of the body are moved together, and so are either generally disposed to go forth by sweating, or Urine, or particularly are sent out forthwith, a vent being made in some private places.

The chief Kinds of them, and the manner of their Administration.

In the first rank are placed Frictions, Liniments, Fomentations and Baths as well dry as moist: Then those particular things that bring out waters are, Vesicatories, and things that bring the Skin to an Eschar, and prickings by a Needle. We will treat briefly on each of these, or at least of the principal of them, as far as they have reference to this disease.

1. *Frictions.*

1. Frictions do frequently afford advantagious success in a Leucophlegmatia and an Anasarca: for when the habit of the body is not only filled with a watery illuvies gathered there together, so that nothing can evaporate, but that the extern parts grow cold by reason of the approach of blood towards them being stopt, often and strong frictions do move together the stagnating waters, and dissipate them from thence in some measure, and also recal again the blood by opening the passages into those parts from whence it was banished; wherefore, not only the swoln members, but also the whole body once or twice in a day, is expedient to be rubbed with a course Cloth, or with a little Brush now ordinarily prepared for that purpose.

2. *Liniments, and,* 3. *Fomentations.*

2. 3. With or after Frictions, Liniments and Fomentations are sometimes convenient. They are prepared either of Salts, and other Minerals dissolv'd, or from hot and discussing Vegetables, with the fæces of Wine boyl'd in water, the hot application whereof opens the pores, moves together more amply the accumulated waters, and discusses them, and also enlarges the compass of the bloody Circuit, the watery heap being somewhat dissipated. Let the Liniments consist of Sulphur, and Salts of a diverse kind, or of Quick-lime, and other Minerals, which being powdered and mixed with the mucilaginous Extracts of sharp Herbs, are reduced into the form of an Unguent; to which let a fit quantity of Oyl of Scorpions be added, for the better consistency. Moreover this Oyl (so it be genuine) applyed by it self, doth frequently afford notable help. I knew a Boy much swell'd with an universal Anasarca, who was cured by this Remedy alone: for his mother (I know not by whose advice) anointed his whole body morning and evening with Oyl of Scorpions, strongly rubbing all the parts with her hot hand; by which act within three days he began to pour forth abundance of Urine, and when he had continued pissing so for some days, the swelling vanishing by little and little, he became sound.

4. *Baths.*

4. Baths are not convenient in any Dropsie but an Anasarca, and not for this unless in a Diathesis or Declination. For seeing the Blood from the heat thereof, encompassing

compassing the whole Body, being made boyling and stirr'd up, every where puts in motion the waters formerly stagnating, and swallowing them up into it self, conveys them variously away; the danger is, lest (as frequently it falls out) receiving them out of the habit of the body into its own mass, it should depose them presently into the Præcordia or the Brain: for there is nothing more usual than an affection of those parts, *viz.* an Asthma or Apoplexy to come upon Hydropicks by unseasonable bathing. But when the conjunct cause of the disease, (*viz.* a Swelling) becomes moderate, or not much, a Bath of water impregnated with Salts and Sulphur, or a Hot-house, by which a gentle Sweat is promoted, is frequently administred with success: As for the Stew it is more expedient, and oft-times notably helps, that the Patients be placed in fitting Seats in Salt-houses, near the Furnaces wherein Mineral Waters are boyled into Salt. PHAR. Part. II.

5. Vesicatories send out abundantly the waters between the skin, and often too profusely. Touching the manner how they operate we will treat more specially hereafter; in the mean time we advise, that they are very cautiously to be exhibited to Hydropicks, for that Epispasticks of this kind, applyed to the swell'd places, do make the Emissarie too open, by which apertion the water in the first place bursting out, draws oftentimes a great illuvies after it from the neighbouring parts, whence immediately ensues a great prostration of the Spirits. Moreover, sometimes the place is so suddenly emptyed, that being destitute of heat and spirits, it is in a short time sphacelated or mortified; wherefore this Medicine is seldom applyed to the Legs, or the Feet of Hydropical persons, where the heat is weak, and the humour greatest, but sometimes to the Thighs and Arms with security (as often as there shall be need.) *5. Vesicatories.*

6. *Escharoticks* are administred a little safer than Vesicatories, to the swell'd places, because from this Emissary the flux of waters happens not so headlong and abundant at first: but commencing moderately grows up by little and little to a great stream, which Nature (after that by degrees it is accustomed thereunto) endures the better. Moreover, there is less fear of a Gangrene from an Escharotick than from a Vesicatory, because in that application the part, whose union is dissolved, is defended by the Eschar against the loss of heat. I have known sometimes an illiterate and rude Empirick, who frequently by an Escharotick did evacuate with success the members of hydropick persons, however swell'd, by the ensuing manner: to wit, he fomented the legs evening and morning with the Decoction of Dwarf-Elder, Wormwood, Cammomile and other hot herbs put into the Lees of Ale or Wine; and between the times of the Fomentations he applyed a Cataplasm prepared of the mass of that Decoction with Bran; after he had used these for three dayes, he covered both legs and feet with a Plaister of *Burgundy* Pitch, leaving only a small hole on each Calf, about the bigness of a Nut, in which places he put an Escharotick, on the bare skin, of the Ashes of Ashen-bark: which after twelve hours being removed, a small Eschar was left, from whose pores water was wont at first slowly to sweat out, afterwards day by day a little more plentifully to drop out, and afterward (the Eschar falling off) it used to flow out more abundantly as from an open Spring untill it had drein'd the whole leg both beneath and above. *6. Escharoticks.* *The empirical manner of Escharoticks.*

7. There remains another manner (not inferiour though less used than the former) of draining out the waters between the skin, *viz.* by the pricking of a Needle; which likewise ought cautiously, and minutely to be used, lest a headlong and too great efflux of waters be provok'd thereby. Take an ordinary Needle (such as Taylors use) and let it be thrust into the skin, pricking over the place chiefly swelled, only so far that blood follow not: and so at one time let six or seven little holes be made, a thumbs breadth distant from each other; from every little hole the water will issue forth by drops, and so it will continually drop out untill all the swelling vanish about the place so pricked; afterwards, the next time after twelve hours, another while after 18 or 24 hours, let the same pricking be exercised in another part of the same thigh, or of the other; and afterwards once or twice aday in this or that member, or in both together, or in more places, let such Emissaries of the water between the skin be excited. For in truth after this manner the hydropick illuvies may be exhausted more plentifully and safely than from any other outward Chirurgery; In the mean time if the new provision thereof be provided against by inward Physick, the disease will be the easier cured. Moreover in a desperate Dropsie life is best prolonged by such an administration, for that the waters being exhausted continually by those outward Emissaries the inner inundation of life is longer protracted. Not long since an old man aged seventy years, overwhelmed with a Dropsie over his whole body, by the help of this Remedy only, remained living for many months beyond expectation, and raised his head above the waters. *7. Pricking with a Needle.*

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The second Indication preservatory what kind of Remedies it suggests.

Forms of them.

Hitherto of the Kinds of Forms of Remedies suggested by the first Indication, *viz.* the Curative; what belongs to the other, to wit, the Preservatory, which respects the temperature and sanguifying power of the Blood to be restored, it offers Medicines of that sort which being endowed with more hot and Elastick particles, revive the active or depressed Principles of the mass of blood, or cause those consumed to be repaired, for which end Remedies commonly called Altering are wont to be prescribed under the form of an Electuary, Powder, Pills, distilled Water, Julep, Apozeme and Diet, to which also Spirits, Tinctures, Elixirs, are sometimes added, for the better efficacy. We will propound one or two Examples of each of these.

1. *Electuary.*

1. *Take of Conserve of Roman Wormwood, Scurvy-grass, the yellow Rindes of Oranges, of each two ounces, Winters-bark two drams, Species Diacurcumæ a dram and a half, of Steel prepared with Sulphur three drams, Syrup of Citron-peels what suffices to make an Electuary, the dose two drams morning and evening, drinking after a draught of the Julep, or three or four ounces of the distilled water.*

Chalybeates profit much in this Disease.

But only those endued with Sulphur.

Chalybeate Medicines notably help in this Disease, as in the green sickness of Virgins, insomuch that frequently the whole or chief scope of curing depends upon this kind of Remedy; yet we are to observe, that not all Medicines of this kind are equally convenient in these cases: for those which are chiefly in use, *viz. Salt of Steel*, or *Vitriol of Mars*, and others prepared with acids, and deprived totally of Sulphur, do not help, inasmuch as they do not promote the fermentation of the blood, but rather on the contrary fix it, being too wild or elastick. But for an Anasarca or any watery tumours, in a cachectick habit of the body, Chalybeates of that sort are given, wherein the sulphureous particles are left, and are predominant; as in the first place the Filings of Iron, and the Scales, reduced into a fine Powder, also Steel dissolved with Sulphur, and powdered. The powders of this being taken, are presently dissolved by the acid Salts within our body, whence the sulphureous metallick particles being set free, and brought into the blood, they ferment the whole mass thereof, and revive the like particles in the same, which before lay dormant, and being conjoyned therewith, they give vigour to the blood, and renew its sanguifying power being formerly depressed. Wherefore we may observe by using but a little Chalybeates of this sort, the green and yellow colour of the face is converted into a florid.

2. *Powders.*

2. *Take of the compound Powder of Aron-roots, of Winters bark, of each three drams, lesser Galangals, Cubebs, of each a dram and a half, of Steel prepared with Sulphur half an ounce, Sugar of Rosemary flowers six drams, make a Powder, divide it into twenty parts. One part is the dose, morning and evening, with a draught of the sudoriferous Decoction before prescribed.*

3. *Pills.*

3. *Take half an ounce of the gummous Extract residing after the distillation of the Elixir Vitæ of Quercetane, powder of Earth-worms two drams, lesser Galangal, Winters-bark, of each one dram and a half, Salt of Wormwood two drams, of Rust of Iron two drams and a half, Balsam of Peru one dram, Tincture of Salt of Tartar two drams, Balsamum Capivii what suffices to make a mass to be formed into small Pills, the dose half a dram evening and morning, drinking after it three ounces of the Julep or the distilled water following.*

4. *Julep.*

4. *Take of the water of Elder-flowers, of the juice of their Berries fomented, of each one pound, water of Earth-worms magistral, of Rhadish compound, of* Aqua Mirabilis, *of each two ounces, Syrup of the juice of Elder-berries two ounces, mix them and make a Julep.*

5. *Distilled water.*

5. *Take the leaves of Garden Scurvy-grass, of Hedge-Mustard, of Pepper-wort, of each six handfuls, of the Roots of Calamus Aromaticus, Galangal, of* Zedoaria, *Orris of* Florence, *of Elder, Aron, of each six ounces, Winters-bark,* Jamaica *Pepper, of each three ounces, Juniper-berries four ounces, Cloves, Ginger and Nutmegs, of each one ounce, slice and bruise them, and pour upon them eight pound of old Rhenish-Wine; distill it in common Organs, let the whole Liquor be mixt.*

6, 7. *Decoction.*

6, 7. An Anti-hydropick Decoction is described above, among the Diaphoreticks. A Diet-drink is to be taken instead of Ale, and is to be made according to the ensuing form.

Diet-drink.

Take of Shavings of Guaiacum, Sassafras, of each four ounces, Florence *Orris-roots, Calamus Aromaticus, Galangal, Enula-campane, of each one ounce and a half, of Juniper and Bay-berries, of each two ounces, Anniseeds, Carue, Sweet-fennel, Coriander and Dill-seeds,*

ſeeds, of each one ounce, long Pepper and Cubebs, of each an ounce and a half, Cloves, Nutmegs and Ginger, of each half an ounce, Jamaica *Pepper two ounces, the dryed leaves of Sage, Wood-ſage, Calamint, Agrimonie, of each one handful, Liquoriſh four ounces ſliced and bruiſed, boyl it in four gallons of Spring-water to half, the ſtrained liquor being cold, let it be kept in glaſs Bottles for uſe; with the conſtant uſe of this drink, I have known many labouring with a deplorable Anaſarca to be made well. Among many Examples of Dropſies cured, I ſhall propound but one.*

An Example of the Cure of an Anaſarca Dropſie.

A certain ſtrong man of a middle age, after he had contracted an Epidemical Quartan Feavour, and being evilly handled from its beginning, had laboured with it above a year, and in the mean while had uſed an ill courſe of Diet, fell into an Anaſarca, which afterwards in a ſhort ſpace augmented hugely, by reaſon he indulged himſelf more freely to drink for quenching his thirſt (which was outragious) ſo that all his members being ſwollen from head to foot, and over the very Abdomen it ſelf, he could not turn in his bed from ſide to ſide without help.

The Prognoſtick and Cure of the Diſeaſe.

When I firſt viſited this man, and deſpairing of a Cure (as the Phyſitian in *Celſus* lib. 3. Chap. 21. *who denyed that any intemperate Hydropick could poſſibly be cured*) I immediately affirmed this Prognoſtick, *That he would dye in a ſhort time unleſs he abſtained from drink.* Whereunto he replying, profeſt he would not drink in a weeks ſpace, provided he might be helped; and indeed did as he ſaid, although being very thirſty, for ſix or ſeven days he ſcarce took any liquid thing in his mouth, but what was Medicine; and during that time, when in the mean while he took Hydragogues, Catharticks and Diureticks, and any other things preſcribed carefully, he became much better, and afterwards the method (before deſcribed) ſomewhile being adminiſtred, he was reſtored to his entire health, and even now though five years ſince lives and continues ſound.

The Concluſion of this Section.

There remain certain other ſplanchnical Affections, touching the Remedies whereof, according to the enſuing method, we ſhould here have treated, notwithſtanding I have performed this task already for the moſt part under other titles; for as is above intimated, Remedies which concern the Kidnies we have for the moſt part unfolded under the rank of Diureticks, and thoſe which concern the Stomach and Guts, under that of Vomits and Purges; what relates to the Spleen we have finiſhed in the Hypochondriac Pathologie; and what to the Womb in the Hyſterical. As to what appertains to the Genital parts and their Diſeaſes, and help, I reſerve for another time and place; it behoves me now next of all, after treating hitherto of the inward Pharmacie, to diſcourſe ſomething of the outward, and of the Reaſon or Ætiologie of the adminiſtrations thereof, which ſhall be done in the next Section, beginning with Phlebotomie, that great Remedy.

SECT. III. CHAP. I.

Of Phlebotomie.

Phlebotomie a very general and ancient medicine.

AMong the univerſal Documents of Philoſophie, or aids of Phyſick, none either in Theory or Practice hath been more ancient or general than the ſpeculation of the Blood and letting it out by opening a Vein. As to the former we have in other places often explicated the nature and conſtitutive parts of the Blood, we have unfolded the Virtues and Energy of the ſame, and have demonſtrated that it is in truth enkindled, and that from the burning thereof the flame of animal life, as of a Lamp, doth begin and receives continuation: But as to what relates to Phlebotomie, all Authors of every age have made mention thereof: Moreover the ſame was ever in Medicinal uſe with all Nations howſoever barbarous or rude. Neither is it a wonder, for truly Nature it ſelf in the firſt place hath taught the neceſſity, and way of that part of Chirurgery; Even the Divine Law commanding the Rite of Circumciſion, as a Symbol thereof, ſeems to intimate that the innate impurities of Humane Nature ought to be purged in ſome manner by letting out the blood.

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That we may methodically diſcourſe of this great Remedie, we ought to conſider, by what means, alſo for what cauſes and ends, the letting of blood either happens ſpontaneouſly to Nature, or is indicated by the Phyſitian; then ſecondly we will annex the chief effects of this Evacuation, as well good as bad, whether advantageous or diſadvantageous, and together propound certain Rules and Cautions to be obſerved, but due adminiſtration of Phlebotomie.

Nature ſhews it by Hæmorrhagies.

As to the former, ſpontaneous Hæmorrhagies (which ſuggeſt the uſe of Phlebotomy) whereas they are manifold and of diverſe kinds, they are uſually reduced to theſe two heads or ranks: to wit, they are denominated either critical, Nature endeavouring ſomething good and wholſome; or ſymptomatical, which for the moſt part happen, ſhe being dejected from her government, and being altogether out of order. The bloody eruptions of the former kind are again diſtinguiſhed; that they are either raiſed without a Feaver, and are either periodical, which happen often at ſet ſeaſons, as the Flowers in Women, and the Hemorrhoids in ſome, and in others the ſolemn or otherwiſe accuſtomed opening of the Noſtrils; which very often ſucceed according to the great changes of the Year, or alterations of the Air: or they are fleeting and uncertain, as when blood doth advantageouſly break out of thoſe places, and of many others, one while in this part, another while in that part of the body. Moreover, bloody Criſes do ſometimes happen in a Feaver, and do often put an end to it, as *Hippocrates* long ago obſerved, and is now manifeſt by very common obſervation. The blood breaks out in all theſe caſes, inaſmuch as being turgid, and above meaſure rarified within the veſſels, it deſires a larger ſpace, wherefore, unleſs ſome portion thereof give way, the whole maſs runs the hazard of being conſtipated, and as well the motion thereof to be hinderer, as the enkindling to be ſuffocated, and the temperature to be perverted.

Critical either with or without a feaver.

The cauſes thereof proceed either,

For there are two chief Reaſons or Cauſes, wherefore ſuch turgeſcencies of the Blood do ariſe: inaſmuch as its liquor is as well inflammable, as fermentative.

1. From the kindling of the blood.

1. As to the former of theſe, that the Blood may be duely enkindled for the ſupporting Life, and the due exerciſe of the functions thereof, it behoves that the innate ſulphureous particles of it be proportion'd unto the Nitrous adventitious ones from the Air. Therefore as often as the Blood being very boyling and rarified, is much opened and looſened in its one conſiſtence, ſo that the Sulphur being diſſolved, is kindled in great plenty, there is a moſt frequent and painful breathing inſtituted for the drawing in of a more plentiful Nitre. Now if the Sulphur abounding in this manner, cannot be waſted by burning, nor the vital flame regulated, the next courſe immediately to diminiſh the ſulphureous fuel, is, that a certain portion of the rarified Blood have vent. From hence, not only in Feavers, but after drinking Wine, Bathings, being in the Sun, and other accidents by which the Blood grows very turgent, either an Hæmorrhagia, of its own accord ſucceeds, or there is often need to ſupply the defect of ſuch a ſpontaneous evacuation by Phlebotomie. But that ſuch kind of effuſions of Blood, whether made by Nature or Chirurgery, are commonly reported to bridle its heat or raging; really they do this only inaſmuch as they diminiſh the kindling of the blood, by withdrawing part of the ſulphureous fuel, as Oyl from a Lamp.

2. From its Fermentation.

2. But moreover in the ſecond place, the Blood inaſmuch as it is a fermentative liquor, it is apt alſo to be extravaſated. Namely, if at any time any heterogeneous thing, and not miſcible, be confounded with its liquor, it grows hot very much, like Wine in a Veſſel, and boyls up in the Veſſels to exclude that diſagreeable thing, which if it can neither ſubdue, nor turn off by Sweat, Urine, or otherwiſe, the Blood it ſelf excludes part of it ſelf as a Vehicle for carrying that matter forth, whereſoever a vent is to be found. For this reaſon, (*viz.* that any diſagreeable or indomitable thing, may be turn'd out of the maſs of blood) divers ſorts of Hemorrhagies happen, as well in feavers as without them; all which are excited by Nature for an intention of good, as alſo thoſe by which the too much enkindling of the Blood is depreſſed: But that frequently it happens otherwiſe, ought to be imputed to divers accidents and circumſtances. But for the moſt part the failure about the ſpontaneous Hemorrhagies critically inſtituted, is either in the firſt place becauſe the blood while it is boyling knows no meaſure of flowing out, and therefore being ſtirr'd into violence, it flows out too much; or ſecondly, becauſe the mouths of the veſſels once opened do not preſently cloſe again, nor are able to be ſhut; or Thirdly, becauſe Nature endeavouring an excretion of blood, doth it by places more open, but often inconvenient; as when an Hemorrhage happens through the Lungs, the Kidneys, Guts, or other Bowels which therefore paſs from a Critical into a Symptomical and often into a malignant Hemorrhage.

1. Critical Hemorrhagies ſometies turn into ſymptomatical.

Neither

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Neither only by theſe means, but by many other failings of Nature, or impediments, do Symptomatical Hæmorrhages happen, in all which either the Blood it ſelf, or the Veſſels containing it, or both of them together, are wont to be chiefly in fault.

2. Symptomatical Hemorrhagies ariſe, either,

1. In the firſt place, the Blood, beſides the reaſons above mentioned, (to wit, forasmuch as it becomes inflammable or fermentable above meaſure) is apt alſo to be extravaſated, becauſe either its liquor being empoiſoned, or otherwiſe corrupted, cannot retain its due mixture, but being apt to coagulate or putrifie, divides it ſelf into parts; and whilſt ſome of them being here and there planted, ſending forth ſpots, wheals, and other brands of Malignity, do diſcolour the Fleſh and the Skin, and obſtruct the proper paſſages; others otherwiſe running out and breaking forth whereſoever there is a vent found, do produce bloody Excretions in divers places, as is commonly diſcerned in the Plague, Small-pox, Meaſles, and Malignant Feavers; yea perhaps this in ſome meaſure is the reaſon why in ſcorbutick Diſtempers, as ſpots and marks, ſo alſo Hæmorrhages are ſo familiar.

Firſt by the fault of the blood.

Secondly, The fault of the Veſſels, for that they are ill formed.

2. Secondly, The Veſſels bringing Blood being faulty many and divers ways, but chiefly in theſe three, do appear the cauſe of a ſymptomatical Hæmorrhage, *viz.* In the firſt place, if perhaps any where ſome of them are obſtructed, as often as the blood aſſumes a more rapid motion, either in the ſame place, or in the contiguous parts, and alſo ſometimes in remote parts it is conſtrained to burſt out. Frequently from ſuch a cauſe an Hæmoptoe proceeds; moreover Spitting of blood, and the Hæmorrhage of the Noſtrils do often follow the ſuppreſſion of the Terms and Hemorrhoids. Secondly, the little mouths of the veſſels (by reaſon of the fleſhy Fibres being looſned or reſolved by which they are clos'd) ſometimes are ill formed, ſo that when the ends of the Arteries do gape too much, the little mouths of the veins do cloſe. By reaſon of this affection, Scorbutical and Cachectical perſons, are found obnoxious to Hæmorrhagies, as we have remarkt in another place.

Thirdly, Forasmuch as they are convulſively affected.

But Thirdly, it frequently comes to paſs that the Veſſels, being ſo evilly formed, are alſo convulſively affected, and ſo the morbific cauſe being as it were doubled, this evil is much encreaſed, inſomuch that the muſcular fibres of the Veſſels being inordinately contracted, cauſe ſudden and violent fluxes of the blood, one while towards the upper parts, another while towards the lower; and ſo their little mouths being open in the mean time, they provoke prodigious Hæmorrhagies. For I have obſerved in ſome perſons, when the current of blood was ſmall enough, with a ſmall and weak pulſe, the Convulſions of the Veſſels generated in ſome place, and propagated under the likeneſs of wind running to and fro in the body, to drive more impetuouſly the blood, however ſlow of it ſelf, and to conſtrain it into violent eruptions; and in caſes of this ſort, when Phlebotomies and Medicines refrigerating and tempering the blood have not at all profited, the greateſt relief hath been found from Narcoticks, Antiſpaſmodicks and Ligatures.

3. From the blood and veſſels being both in fault.

3. Thirdly, If perhaps it ſhall happen that theſe faults of the Blood and Veſſels are complicated, and put forth their miſchiefs joyntly at once; from thence it will be of neceſſity that this evil will be more intenſe, and more frequent and prodigious Hæmorrhagies will be raiſed: the reaſons of which as they appear plain enough by what goes before, it will be neither neceſſary nor ſeaſonable here longer to dwell upon explicating of them; but rather whereas we have deſigned hitherto the acts of Nature about ſpontaneous effuſion of Blood and its courſes both rightly inſtituted, and alſo wrongfully and evilly conſtrained; now it behoves us next to declare, how far Art (for the moſt part the Ape of Nature, and ſometimes Miſtriſs or Moderatrix thereof,) can act likewiſe well, or better about letting of blood, and how ſometimes it is wont to ſucceed worſe.

Emiſſion of the Blood procured by art.

We advertiſe of theſe things in general, that a Phyſitian imitates Nature in ſome caſes of letting blood, exceeds her in other caſes, and frequently regulates and reduces her when acting amiſs. Moreover, there are ſome caſes wherein nature excells far the efficacy of Art concerning bloody excretions; briefly of each of theſe.

1. It either imitates Nature.

Therefore in the firſt place, in whatever affects, ſpontaneous Hæmorrhagies are wont to bring help, when th ſe are wanting, Phyſick the Handmaid of Nature rightly ſubſtitutes Phlebotomie. Therefore, if perchance the Blood be immoderately kindled by reaſon of its Sulphur being too much looſned and advanc'd, by breathing a vein, what is ſuperfluous of that inflammable fuel will flow out, as alſo the immoderate turgeſcency of Blood, by reaſon of ſomewhat untamable being mixed with it, will be allay'd by this courſe. Wherefore letting of blood is advantageouſly adminiſtred, as well againſt continual Feavers, which proceed from the former cauſe, as intermittent Feavers, whoſe fits proceed from the latter cauſe. Alſo in like manner, as often as an accuſtomed evacuation being ſuppreſſed, or a humour driven back from the

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the outward parts, or a ſudden ſtoppage of the pores, or if a Surfeit, drinking of Wine, or other accidents of this nature, cauſe a turgeſcency of blood (inaſmuch as they daſh heterogeneous particles againſt it) Phlebotomie is uſually the moſt ready Remedy.

2. Or excells and regulates it.

Secondly, Phyſick in Blood-letting, not only imitates Nature, but often excells it; and alſo ſuccours her being weakned, and reduces her often erring. For if at any time the blood ſtruck with violence, ruſhes in a heap againſt any part, and either preſently breaks out in the ſame place, or abundantly gathered together engenders an Inflammation, a vein being pierced in a remote place, ſtops that preternatural tendency of the blood, and frequently carries away the bleeding, or inflammation. Wherefore, in a Pleuriſie, a Squinancy, a Peripneumonie, in ſpitting or vomiting of blood, when Nature is vanquiſhed, or being outragious, ſeems to caſt violent hands upon her ſelf, Chirurgery recalling the blood to another part, and ſending it out, reſtores the matter that was almoſt deſperate.

Moreover Phyſick frequently reſtrains or reduces Nature, when too prodigal or prevaricating in pouring out of the blood: for in truth all immoderate Hæmorrhagies do want Bridles, not Spurs. But in the Plague, Small-pox and Meaſles broke out, and in Malignant Feavers, ſometimes the blood ſpontaneouſly flowing out, portends for the moſt part evil; therefore in thoſe affects ſtyptic Remedies, or things ſtopping the eruption of Blood, are more convenient than breathing of a Vein.

3. Or Art outdone by Nature.

Thirdly, Notwithſtanding on the contrary there are caſes of ſhedding blood by Nature, which phyſick can no way imitate, neither if they chance to fail, can be ſupplyed by Phlebotomy. In Feavers about the Criſis of the Diſeaſe, to wit, after the digeſtion of the matter, that is to ſay, the preparation for Excretion, ſpontaneous Hæmorrhagies if coming in time, do far excell any Phlebotomie which none knows the beſt ſeaſon of; Moreover, the Fluxes of the Terms and Hæmorrhoids happening by Natures inſtinct, are more advantageous than the miſſion of blood provok'd by Art in any of thoſe places.

Phlebotomy and ſpontaneous Hemorrhagies differ as to the ſubject and matter.

Between Phlebotomie and ſpontaneous Hæmorrhagies, there is yet a notable difference, (although not of great moment in Phyſical practice) *viz.* both as to the Subject and Matter of either of them; for in this the blood being florid, and throughly Scarlet, doth for the moſt part only flow out of the Arteries, but in the other Evacuation the Blood being of a black purple with a Scarlet Cream, is only drawn out of the vein. Whence the ſtream of Blood, which is one within all the veſſels and throughout continuous, acquires ſuch a diverſe kind of appearance, ſeeing we have ſhewed in another place, it is not our preſent purpoſe to make any further ſearch into this Ætiologie; becauſe it concerns not much to the curing any diſtemper, out of what veſſel the blood be let, provided it flow out largely: But that the ancients do in ſome caſes commend Arteriotomie, and prefer it to an inciſion of a vein, the Circulation of Blood not being then known, we have elſewhere diſcourſed how well it may be done.

The uſe and effects of Phlebotomy.

Hitherto of Phlebotomie compared with a ſpontaneous Hæmorrhage; now our next buſineſs is, to deſcribe the uſe and effects thereof, as well good as bad, in Phyſical practice. Wherefore we will firſt ſhew in general what alteration of the maſs of Blood this Evacuation brings; then what diſeaſes it more immediately reſpects, either of the whole body, or its particular parts.

How it affects and alters the Blood.

About the former, it is obvious enough that the blood is altered by breathing a vein, both as to its quantity and temperament, and as to its diſpoſition and motion.

1. Diminiſhes its quantity.

The firſt and moſt common Indication of Phlebotomie, is, that the plenty of blood be diminiſhed by this Adminiſtration. And truly this is a vulgar Remedy, to remove or provide againſt a Plethora. Any one, though of the vulgar ſort, growing to a full habit of body, lets blood without the advice of a Phyſitian; Moreover Ruſticks and Country men for healths ſake, once or twice in a year cauſe blood to be drawn from themſelves and their Beaſts. But although this cuſtom is grown ſo much in uſe with ſome prodigal of their blood, that they breath a Vein on the ſmalleſt occaſion, and ſometimes without any manifeſt cauſe; notwithſtanding we may find many others no leſs obſtinate againſt this cuſtome, inſomuch that for no cauſe will they loſe any blood, unleſs the greateſt neceſſities be urgent.

Emiſſion of the Blood is not to be either too prodigally, or too ſlenderly made.

The reaſons of the former hinted at.

Upon this matter (whereas Arguments are alleadged on either part,) that I may in few words determine what ſeems fit to be ordained, in the firſt place it is requiſite we grant, that letting blood is convenient againſt a Plethora either made, or beginning: for by no other Remedy are the evils of that Affection wont to be better removed or provided againſt. Notwithſtanding, the neceſſity of this evacuation ought to be declined as much as may be; becauſe from thence (as we have intimated elſewhere) the blood becomes more ſulphureous, and leſs ſalt, and for that reaſon it moſt

most commonly disposes all men to be feaverish and to be fat. Moreover the Great Remedy Blood-letting, if it be prostituted to every little occasion, becomes less efficacious to any grand affections when need requires: To which we may add, that according to the vulgar observation, by how much the more familiarly any one uses Phlebotomy, he will the more frequently stand in need of it: for blood being emitted to avoid a Plethora, the rest of the mass will the sooner rise to a Plethora: far otherwise than is the opinion of some, who dread lest the store of blood be consumed by frequent Phlebotomy; for that on the contrary by this means the quantity is more encreased, although the Crasis be the worser: for so the blood having lost much of its balsamick Salt, and preservative against putrefaction, instead thereof, is filled with a pinguifying and more fiery Sulphur.

2. Phlebotomie amends the mixture of the Blood.

Secondly, Phlebotomy doth frequently correct the mixture and temperament of the blood in a manifold respect. For in the first place, if any thing heterogeneous be confounded with its mass, which cannot be rightly digested, nor easily excerned and sent away, a Vein being opened, the blood flowing out conveys frequently much of the portion of that matter forth with it, insomuch that the rest may be either subdued or expell'd. For the orifice of a vessel being opened, presently the blood fermenting gathers together the extraneous particles as much as possible, and excludes that portion of it self wherein many of them are heaped up: From hence we may observe the blood flowing out first and last to be well enough, when that emitted between appears corrupt.

It restores its temper.

Also secondly, the blood declining from its temperament, is frequently restored by Phlebotomy. For when the mass thereof by the Sulphur or fixt Salt, or both together being exalted, shall degenerate into sharp Salt, or saline-sulphureousness, a portion of the blood being withdrawn, immediately a new fermentation thereof arises, and very often there is a transposition made of all the particles of that sort, that afterwards the Spirits may a little emerge with the volatile Salt, and recover their dominion, the Sulphur, and fixt Salt (as is fitting) being subdued. For this reason it is that letting Blood doth not only confer great help in Feavers, but also in the Scurvy, Jaundies, and beginning Consumption; for the blood after the Vessels are emptyed, like the Stomach disburden'd, doth better digest and assimilate any humours ingested, and the more easily throws off and separates whatever is heterogeneous.

Some distempers of the blood admit not Phlebotomy.

But if the mixture of Blood begins to be much loosned and become very bad, as in the Plague and malignant Feavers, we must altogether abstain from Phlebotomy; for the blood being withdrawn, the store of Spirits (whose only part it is to vindicate the mass of blood from putrefaction and corruption) is diminished, so that immediately all things tend to a deadly dissolution. Moreover, if the Dyscrasie of the blood shall be of that manner, that the more noble Principles, to wit, the Spirit, the volatile Salt and Sulphur, being depressed or consumed, the watery and earthy particles predominate, the blood ought not to be sent out, but preserved even as the treasure of life; for when the abundance of Spirits are so small, any loss of them doth cause all the functions to stagger, and gives way to the disease; wherefore in a Dropsie, Cachexia, Consumption, and other Distempers, where the active Principles are greatly depressed, the opening a vein is almost the same thing as cutting a mans throat.

In some cases about Phlebotomy it is very doubtful.

In the before mentioned cases, where the temperament of blood is respected, it is easie to determine, whether Phlebotomy be convenient or not; but in some others, as in a putrid continual feaver, when upon this hinge Life and Death are turned, there is need of the greatest deliberation: and so much the rather because the event of the Disease, and the success of all the accidents in its whole course, whether good or bad, is usually imputed to Blood-letting, or its omission: and from hence it is, that Physitians being solicitous to preserve their own repute, do chiefly raise doubts in their consultations of this matter.

And chiefly in a continual putrid Feaver.

But truly in this difficult knot that we may not be led by the rumour of the vulgar (as it chances to happen) one while approving, another while condemning Phlebotomy, but with more certain advice: we must consider the state of the Blood, the tendency of the morbific matter, and the strength of Nature. First as to the former, if in a putrid Feaver, the blood very much growing hot shall raise a great heat, with thirst, watchings, and burning of the Jaws, and no eruption of abundant sweat, nor pushes appear, or is suddenly expected, opening of a vein is so clearly demonstrated, that it is a wickedness to omit it; but on the contrary, if in a languid body, a slow and a remiss Feaver, but continual, arises, with a weak Pulse, let Blood-letting be spared, and the cleansing thereof be procured by breathing Sweats, Urine, and blistering.

How the doubt is to be determined.

Notwithstanding, in a middle state of Blood, and of a Feaver, Phlebotomy almost indifferent in it self, is determined by other things. Therefore secondly we must weigh the tendency or flux of the morbific matter, which

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if it remain dull in the mass of blood, and unfit to be separated, and so (as it is frequently wont to be) instead of a Crisis, a translation towards the head be made, and threaten the brain and nervous stock, the cutting of a vein ought seasonably to be administred, whereby these evils may be provided against. Notwithstanding, if that this matter being soon raised into a rage, and either rushing inwardly to the bowels of the nether Belly, provokes a huge Vomiting, or Dysenterical affections, or being driven outwardly, seems to be about to bring the Small-pox, Measles, and other pushes, every such force of Nature, if good, ought not to be disturbed, if evil, not to be made worse by Phlebotomy; for in these cases it is not only dangerous to let blood, but also very scandalous. Thirdly, about Phlebotomy to be administred in a doubtful case, we are to take heed to the strength of the Patient; for in a healthful Constitution, a vigorous Age, the commencing of a Disease, and the functions both vital and animal being yet in a florid or indifferent estate, we may confidently prescribe letting of blood, unless something indicates the contrary. Notwithstanding, when it is otherwise, as to those conditions, we may not rashly proceed to that Evacuation.

Thirdly, Phlebotomy corrects or stays the inordinate motions of the Blood.

Thirdly, the inordinate motions of the Blood, when being very much moved, as it were with fury, it either rushes impetuously one while into these parts, another while into those, or tranferrs the noxious matter, are best restrained or reduced by Phlebotomy; wherefore in great Cephalalgies, in all soporiferous or convulsive invasions, for Catarrhs, Opthalmia's, and a Cough, Asthma, fits of the Gout, and Stone, or Phlegmons, Erysipelas's, also for many other Distempers, raised by the flowings of the Blood or Serum, an incision of the vein is commonly prescribed, and indeed for the most part as with good success, so altho upon right Reason; for the Vessels being emptyed, the blood having obtained a more free space, is circulated pleasantly and undisturbedly, besides, whatever is extravasated of the Blood or Serum, is wont to be suckt up again and reduced into its course.

What Diseases, and of what parts Blood-letting chiefly respects.

The effects as well good as bad being thus shewn, which happen to the blood in the manifold state thereof, by Phlebotomy, we will next make strict examination what Diseases chiefly, either of the whole body, or of any private Region that kind of Remedy doth more immediately regard. And first as to what relates to general Distempers, it is commonly enough known, that letting blood is indicated by a hot and dry temperament, and interdicted by a moist and cold. It is usually propounded in every Feaver, but never in a Dropsie. Moreover, if we consider particular Diseases, there is no region or part of the Body, but as they rejoyce in the influence of vital as well as nutritious blood (as long as it is well) so as often as it is disturbed in any place, or reaches out any disagreeable or provocative thing, in place of benign Juice, it requires avocation and a letting out thereof. If I should take notice of every single case of this Indication, we should here rehearse almost the whole Pathologie of the humane body. An aking Head, a Brain oppress'd with blood, or overflowed with Serum (whence spring a world of evils) burning of the eyes, inflammation of the face, mouth and throat, all the diseases of the Breast and Præcordia, (in as much as the disorder of Blood affords a rise or fuel to each of these) likewise obstructions or inflammatory affections of the Liver, Spleen, and other Bowels; moreover, as a Plethora, and Athletick habit of the whole body, so also the tumours of each member, painful and convulsive passions, seem to accuse the blood as Author of all the evil, and require its sending out, as a certain kind of revenge.

After Phlebotomy being indicated these four things following ought to be considered. First the place from whence Blood is to be taken.

In these and very many other distempers, if at any time Bleeding be clearly indicated, before it be performed four things ought to be considered, *viz.* In what place, by what manner and instrument, at what season, and in what quantity the blood ought to be taken away.

First, as to the former, although according to the Laws of the Circulation of the Blood, as often as the mass should be diminished, it differs little from what vessel a part thereof be taken, provided it be large enough; notwithstanding, for that besides a general evacuation of the blood, sometimes a particular one properly called Derivation (as when the blood is to be brought out of a private place where it is accumulated) and moreover a Revulsion, when it is to be called into this or that part, are intended; for that reason, in a humane Body there are appointed as it were various Boundaries, out of which, now by this, now by that, or by another vein, the blood may be emitted as occasion is given, and for the uses chiefly requisite.

If therefore at any time an universal Evacuation of the blood be indicated, the median vein of the Arm is best to be opened, for this is easily opened being large enough, and whereas it equally flows from the whole body to the orifice thereof being open enough, by whose more free efflux not only a Plethora is taken away, but the greater vessels being every where emptyed after this manner, the blood stagnating in any place,

place is brought into motion, and being extravaſated is again ſwallowed up into the veins; wherefore, in great diſtempers when the blood being heaped in the Brain, or Præcordia, does threaten ſudden deſtruction, the beſt way not only of general Evacuation, but of a Revulſion, is to ſend the blood by a full current out of the vein of the Arm, being largely open'd.

In ſome caſes from the Arm.

But if without any great Plethora the blood ought to be evacuated from the whole, and pulled back from the upper part of the body towards the inferiour, as in the ſuppreſſion of the menſtrual Flux or Hemorrhoids, it will be rather fit to bleed in the Foot or ſedentary veſſels by Leeches. But if after the blood being evacuated from the whole, it be alſo to be derived from any private part where it is accumulated, let its drawing off be near the place affected. Hence in Cephalick Diſeaſes, we open the vein of the Forehead, of the Temples, or of the Throat. To cure Tumours, or pains raiſed in the Joynts, we cut a veſſel either beneath or near them, or draw out the blood by Cupping-glaſſes or Leeches. In like manner in diſtempers of the Thorax and nether Belly, either Cupping-glaſſes are applyed to the region ſuffering, or Leeches to the ſedentary veſſels.

In others from the vein of the Forehead, Temples or Throat.

But that ſome Veſſels are reported to bear a peculiar reſpect to certain Bowels, and that they ought to be lanced in their diſtempers; *viz.* ſuch are the outward brachial vein, which is ſaid to reſpect the head, and the inward the Liver, alſo the outer vein of the Hand tending to the Ring-finger, which is ſaid to reſpect the Spleen, and for that cauſe this is called the Salvatella, and the former of them the Cephalick, and the other the Jecorary; all this is meerly a vulgar error, which being propt by no reaſon or Anatomical obſervation, I am ignorant whence it took its origine; Therefore as ſoon as it is agreed on to cut a vein and its place, let a large Veſſel be choſen, and very conſpicuous, that it may the more eaſily be opened; and being remote from an Arterie, Nerve, and Tendon, may be the more ſecurely lanced; wherefore in the Arm the median vein is commonly choſen, although the Cephalick being leſs environed with other Veſſels, is the more ſafely opened.

The Cephalic Vein of the Arm, the Liver Vein, or the Salvatella erroneouſly ſo called.

The Jugular Vein is almoſt always opened as often as blood is let in Beaſts, it is a wonder it hath not obtained the ſame Cuſtom in Man, when the large and eminent Pipe hereof may moſt eaſily and ſafely here be cut, becauſe it neither hath an Arterie for its companion, and lies a great way from any Nerve. Moreover, from this Veſſel as from any other whatſoever opened, an univerſal evacuation of blood is made from the whole body, and together the beſt derivation thereof from the head, ſo that all the ſtagnations or aggeſtions of the blood and Serum are diſcharged thence.

The Jugular Vein is moſt ſafely opened.

Concerning Veſſels in the foot or the hand there is no great reaſon of choice, but take the Vein which chiefly ſwells: it matters little concerning the Place, unleſs that if inciſion be made above, or near the Ankle, there is great care to be taken leſt a Tendon be hurt, which ſometimes by unskilful or raſh Chyrurgeons happens to the damage of the Patient. Moreover, let care be taken leſt a Vein be cut near its Anaſtomoſis with an Artery, for if this be committed, the blood being entirely Scarlet, will impetuouſly skip out, and the flux thereof is not eaſily ſtayed, nor the orifice of the veſſel ſoon ſtopt.

Of Veins in the hand or feet.

The chief places being thus deſigned of letting forth the blood, and the choice of the Veſſels being ſhewed, we ought next to treat of the Manner or Inſtruments by which blood is drawn out; which is uſed to be done either by a Lancet, in cutting the Vein, or by ſuction by Leeches, or by Cupping-glaſſes after Scarification. But there is no need of diſcourſing theſe, becauſe each of theſe parts of Chyrurgery are every where in familiar uſe by Quacks, Barbers and Women, and all things relating to them ſo commonly known, as a man his own houſe; wherefore we will ſpeak but one word.

we ought to conſider by what means or by what inſtrument the Blood ought to be drawn forth.

Helmont of late, and ſtill certain followers of him, Pſeudochymiſts and Fanaticks, have ejected Bleeding out of all Phyſick, becauſe they think this evacuation to be a great injury to nature, (which being aided either by her own ſtrength, or by their Panacea's, they will have to overcome every offenſive thing of her ſelf;) Surely, this is no leſs ridiculous a thing than that long ſince *Chryſippus*, *Apæmantes*, *Strato*, and ſome others, (as *Galen* reports) damn'd this Remedy, becauſe a Vein is difficultly known from an Artery. Truly it is manifeſt enough by ſad experience, that in cutting a vein ſometimes an Artery hath been pierced; whence either death or loſs of the member ſometimes enſues: the reaſon whereof is, not as is commonly alleadged, that the coats of an Artery being more nervous or membranous than the coats of a Vein, can ſcarcely or not at all be healed, when in truth that Veſſel is endowed with more and thicker fleſhy fibres; but the cauſe is, that an Artery like the Heart it ſelf, ought inceſſantly to ſhake and beat, the fibres thereof repeating perpetual turns of Syſtole and Diaſtole; wherefore, a little hole being made in its

Some of the Ancients as well as Moderns have ridiculouſly exclaimed againſt letting of Blood.

Wherefore in opening a Vein the pricking of an Artery is ſo dangerous.

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Pipe for the moſt part remains uncurable by reaſon of the continual motion of the Veſſel, and the efflux of blood. It is otherwiſe in a Vein whoſe opening is immediately ſtopt of its own accord; for but little of contractive work lies in its Coats, yea this only, that its fibres being lightly opened as occaſion ſerves, the blood flowing back of its own accord, is gently moved forwards; and after Phlebotomy, the veſſel being empty, they are permitted to be quiet, ſo that in the mean time the little hole made by inciſion is eaſily glewed together. Wherever Phyſitian or Patient do dread the opening of a vein to be adminiſtred, drawing of blood by Leeches or Cupping-glaſſes, will aptly enough and with like advantage ſupply the defect hereof. Moreover theſe adminiſtrations to remove the conjunct cauſe of a diſeaſe, where there is need rather of partial than general Evacuation or Derivation, are frequently preferr'd to Blood-letting it ſelf. There is no need to dwell longer on explicating the manner and reaſon of the effects of either of theſe operations, commonly enough known, but proceeding to other things, we will next throughly weigh the Time and Quantity of letting Blood.

Thirdly, The Time of letting Blood comes into conſideration.

The opportunity of letting blood is often of ſo great moment, that whereas this Evacuation ſucceeds well at one time, at another it highly prejudices: But there are diverſe reſpects of time to be conſidered about the due performance of Blood-letting, but chiefly theſe four: The Time of the Diſeaſe, the Age, the Year, and Day: The firſt concerns chiefly the Cure of the Patient, the others the Preſervation of him.

1. *In reſpect of the Diſeaſe.*

Firſt therefore if blood ought to be let in any Diſeaſe, it will be chiefly ſeaſonable about the beginning or encreaſe thereof, but not at all or very cautiouſly in the ſtate or declination. For at that time whilſt Nature is buſied, endeavouring a Criſis, ſo that the Spirits are in great labour, and the blood ferments very much, that great endeavour of it ought not to be diſturbed; and in the height of the diſeaſe, either Nature being Conquereſs doth not want ſuch a relief, or being ſubdued will not endure ſuch an Evacuation.

2. *In reſpect of age.*

Secondly, If at any time for preſervation it be deliberated touching letting blood, Infants, Boys, and Old men, by the Cuſtom of all Nations obtain an exemption; alſo this evacuation was wont to be interdicted to pregnant Women, but now moſt commonly preſcribed. Men of a vigorous Conſtitution and middle Age, do well enough endure Phlebotomy, and oftentimes want it. Notwithſtanding the firſt and ſecond time it ought not be done without great occaſion, for that being once begun and afterwards repeated, it will ſoon proceed into an inevitable Cuſtom.

3. *In reſpect of the Year and its parts.*

Thirdly, Hence they who uſed to let blood Spring and Autumn, afterwards cannot omit this evacuation without hazard. But to whom it will be either profitable or neceſſary to breath a Vein once or twice a year, the chief ſeaſonable times will be in the beginning of Spring and Autumn, *viz.* when the Blood being prone to ferment anew, is in danger to change its Craſis. Phlebotomy ſeaſonably adminiſtred, provides leſt the Sulphur and Salts being exalted, it ſhould contract a feaveriſh, ſcorbutical or other peccant diſtemper; likewiſe, leſt ſuffering a flux, it ſhould pour forth the ſerous Recrements, and other Feculencies upon the Brain, the Lungs or Bowels of the nether belly. About the Solſtices, when our bodies are very cold, or hot, the blood, as the juice of all Vegetables, conſiſting in a more fixt ſtate, and unapt to ſwell up, ought not to be let out, unleſs upon ſome urgent cauſe.

The Aſpect of the Moon and Stars are here of no moment.

But whereas ſome preciſely, or rather ridiculouſly, obſerve about Phlebotomy, (even as the Countrey men about Gelding Cattle,) the poſition of the Heavens, and the Aſpects of Moon and Stars, it appears altogether frivolous; and for that chiefly is this Cuſtom condemned, inaſmuch as counterfeit Aſtrologers have a Figure in their Almanacks wherein every ſign of the Zodiack, is allotted to every particular member of our bodies; and for that cauſe, under what ſign the Moon is converſant, they forbid blood to be drawn from the reſpective part of man. They who obſerve without reaſon the Heavens, do err (as the ſaying is) the whole compaſs of the Heavens. Moreover, this vulgar error is not only abſurd, but frequently malevolent, inaſmuch as many of the common people will abſtain from Phlebotomy whatever indication makes for the ſame, if (as they ſay) the Sign be in the place of lettting blood.

4. *The time of the day about letting of Blood.*

Fourthly, As to what relates to the time of the Day, in acute Diſeaſes when a Phyſitian is ſent for, and there be indication for Phlebotomy immediately to be performed, after the body is prepared, he may preſcribe that operation any hour in day or night; but otherwiſe, if any interval may be allowed, then breathing a Vein rather is to be celebrated in a morning when the Stomach is faſting, the veſſels emptied by ſweat in the night, the ſtream of blood being quieteſt, and appearing free from any ſerous filth. Yea although neceſſity urge, it may be deferr'd a little until the new

Juice

Juice of things eaten be pass'd into the blood; for the vessels being emptied will not only snatch the crude Chyle into themselves, but frequently what is disagreeable or unproportionate into the blood, whence not only its motion is disordered, but also the vital flame runs the hazard of being extinct. I have known some by Phlebotomy administred presently after plentiful Drinking, or pouring in of vinous liquors, to have fallen into dreadful swounings away, which have lasted very long, until the vital spirit being almost overwhelmed recovered it self again.

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5. The Quantity of the Blood to be taken away ought to be considered.

Moreover in the fifth place, the opening the vein being indicated, and its time appointed, there remains still no little consideration to be had, what Quantity of blood is to be let out, in which point there is most commonly a fault committed, while some being too audacious, and others no less timerous, they affix those bounds on this or that side of which for the most part consists the Right. For that I may omit those who scarcely or not at all admit of Phlebotomy (as I have before hinted) so I cannot easily assent to their practice who fear not to draw blood to swounings: Besides, an error of no light moment is committed within the moderate bounds, while in some cases blood is drawn by too sparing a hand, and in others with too free. In a burning Feaver, Pleurisie, Peripneumonia, Squinancy, Frenzie, Apoplexie, and other great diseases, that have their origine from a turgescency or phlegmonic incursion of the blood, a sparing Phlebotomy doth always more prejudice than advantage. For besides that it doth not remove the antecedent cause of the disease, to wit, the Plethora, it further causes the conjunct cause, *viz.* the inflammation and bursting out of the blood to be augmented. For truly it is a constant observation, that upon blood too sparingly drawn, the whole mass doth boyl up more notably, and doth acquire a new flux into the part affected; the reason of which is, that in a great Plethora many portions both of the Blood and Serum being thrust forward into recesses and strait places, are there constrained to abide; which, after the Vessels being a very little emptied, do impetuously regurgitate into the mass of blood, and do much disturb it, and force it more impetuously to and fro. Wherefore also in this respect the vessels ought to be very much emptied, *viz.* that besides freeing the former Juice from straitness, also space may be given to the Juice reduced from exile, which otherwise being not congruous, coming upon the blood, troubles it, and provokes it into effervescencies and eruptions. From hence we may observe, that almost all men grow more hot presently after Phlebotomy, and yet the blood being sufficiently evacuated, a little after they enjoy a more temperate condition.

Too much Phlebotomy to be avoided.

But a more sparé Bleeding often hurts and fixs a feavour.

The Reason of which is declared.

But as a slender withdrawing of blood in some cases is not only vain, but is performed with prejudice, so in other cases too much effusion is rarely committed scot-free, and sometimes brings notable detriment of health. For when either strength languishes, or the body labours under a notorious Cachexia, we must spare Blood-letting, and its taking away is either prohibited, or being indicated by some accident, is allowed but in a small quantity. Wherefore in men endowed with a weak, tender and cold Constitution, and in consumptive persons, those affected with a long or malignant Feaver, also in Hydropicks or Cacochymicks a vein is not rashly to be breathed, at least if it be, much blood is not suffered to be taken away. It will be an impossible thing to prescribe general Rules, according to the particular cases of every individual person, whereby the quantity or letting Blood may be exactly proportion'd according to the strength of the Disease and the ability of the Patient; but let this be left to the judgment of the prudent Physitian present, and let his Commands be ever exactly observed; And let not (as it every where is) such leave be given to Quacks, Empiricks and Barbers to play with humane life, who every where rashly and wickedly use Phlebotomy; and if the blood spring more freely and appear discolour'd, therefore bragging of the vessel being well pierc'd, they say it must be let out more plentifully, because it appears bad, when oftentimes on the contrary it ought to be spared.

In some cases the mission of Blood must be altogether avoided.

As soon as the Quantity of Blood to be taken away is determined, our next care ought to be, that a more large orifice being made, the blood equally mixt may flow out as soon as may be; for otherwise, if it go out from a small hole, or drop by drop, or with a little stream, the mass of blood fermenting will separate into parts, and what is more subtile and spirituous will burst out, the thicker and feculent remaining behind. Hence it is to be observed, that the blood being let out of a large orifice with a more full stream, if it be a little stopt with the finger clapt on it, and a little after suffered to flow out, the blood going out the second time becomes much purer and brighter than the former, because in the interval of flowing, the more subtile particles being unfolded from the thicker, and accumulated together, have prepared themselves to fly away. Wherefore, if *Hippocrates*'s Precept shall be observed, *viz.* to let

Phlebotomy ought ever to be done with a large orifice.

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let it run to the change of its Colour, it behoves us to procure that it ſpring out quickly, with a full and not interrupted ſtream. Beſides all this, as to what appertains to the alteration of the blood let out, and cold, and to the inſpection and the judgment thereof, for that we have often diſcourſed it in other places, we now paſs it by, haſtening to other things; and now the thread of Method leads us to entreat of Remedies oppoſite to Blood-letting, to wit *Iſchæmones*, that is, thoſe which are convenient to ſtop immoderate Hæmorrhagies, whether engendred by Nature or by accident.

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Of Remedies reſtraining or ſtopping of Blood.

Every Hemorrhage is not to be ſtopt.

EVen as Art imitates Nature in letting forth the blood by Phlebotomy offending in plenty, or temperament, or in its motion, ſo it ſuccours her being diſeaſed or working wrong, by ſtopping the flux of blood whenſoever it is immoderate or hurtful. Whereas there are various and many ſpecies of an Hemorrhage, there is no need of Phyſick for them all. If perhaps a great effuſion of blood happens by a ſolution of unity, excited by an outward accident, as a wound, or ſtroke, Chirurgery ſuggeſts the manner of Adminiſtrations whereby it ſhould be reſtrained. Moreover an Hemorrhage as long as it ſhall be Critical, ought to be diſturbed by no Medicine, but left to the meer government of Nature (as long as ſhe does aright uſe her power;) and as to the Symptomatic, whileſt it is little or not much troubleſome, there is required no Phyſick: notwithſtanding there is great need of it, if at any time the Flux of blood be either immoderate, or flow out by unapt places.

But only the immoderate and inconvenient.

Eruptions of blood of this laſt kind chiefly challenge a Cure, if perhaps the blood be caſt upward by Coughing or Vomit, or downwards by ſeige, or thrown off through the Ureters. For in theſe caſes, though the quantity of the Blood excreted, be not much to be dreaded, notwithſtanding becauſe often a dangerous or mortal Ulcer enſues the ſolution of the Unity ſo made in the Lungs, or in the Stomach, Guts, or in a Vein; therefore we muſt induſtriouſly rancounter thoſe Hemorrhagies from their firſt appearance. Therefore amongſt the Diſeaſes of thoſe parts, ſuch bloody excretions are accounted; but we have already in another place delivered the Theories of Spitting Blood, and of the affection Dyſenterical, and the reaſons of healing them, ſo that there is no need to repeat them here; neither alſo to propound here a remedy for bloody Urine, for that it belongs to the Nephritic Pathology; wherefore we will paſs to thoſe Paſſions, for which by reaſon of an immoderate efflux of blood, there is great need of reſtraining Medicines.

The chief Caſes of the latter are reckoned.

And alſo of the former.

The kinds of theſe Affections are chiefly three, *viz.* Hæmorrhage of the Noſtrils, of the Flowers, and the immoderate Flux of the Hemorrhoids: The Cure of which laſt doth belong more to Chirurgery than Phyſick, and I think it beſt to referr the other to the hyſterical Pathologie. Here properly belongs to this place the blood flowing out of the Noſtrils, being the moſt general kind of paſſions of that ſort, and common to every Age, Sex, and Temperament, ſo that from the Diagnoſtick and Therapeutick of it duly aſſign'd, the uſes and efficacies of Medicines ſtopping blood will beſt appear: for what we proffer for the unfolding the Cauſes and Cure of this bloody eruption, may be accommodated unto all other dreadful Hemorrhagies.

For the preſent the Cure of the Hemorrhage of the Noſtrils is only propounded.

A deſcription of the Veſſels from which Blood flows.

It is obſervable enough, that the Flux of blood from the Noſtrils doth happen to moſt men from extraordinary occaſions; for as oft as the blood, about to break out through its own turgeſcency, or through laxity of the veſſels, is apt in ſome place to make or find its way, it is, by a certain inſtinct of Nature, very often directed to the Noſtrils, as to the part moſt eaſily opened. The veſſels, from whence it flows in that place, are ſlips of the arterial Branch going from the Carotides, after having paſs'd the Cranium, it comes to the baſis of the Cerebrum; for this proceeding near to the mamillary Proceſſes, ſends very many twigs from it ſelf every where about, of which ſome eminent ones paſſing the hole of the Sieve-like Bone with the ſmelling Nerves, are diſtributed through the glandulous membrane inveſting the windings of the top of the Noſe. Theſe naſal Arteries departing firſt from the Trunk of the Carotides within the skull, anticipate part of the blood chiefly ſerous from the brain, and lay aſide the Serum it ſelf and other watery recrements into

into the glandules of the Noſtrils, as into the proper Emunctories of that Region, whence they diſtill into the cavity thereof. Wherefore, if the mouths of thoſe little Arteries do always gape ſomewhat by reaſon of the ſweating out of the Serum, it is no marvel if the blood it ſelf being made more turgid, opening them a little more (which often are too looſe of themſelves) burſts forth of doors. Indeed this Emiſſary both of the Serum and of the Blood, being apt ordinarily to open, or on any occaſion, prevents or cures great incommodities of the brain, or of the Præcordia, yea and ſometimes of the whole body.

They are the ſame by which the Serum diſtills to the Noſtrils.

For in the firſt place, this way the Serum (as I ſaid) is derived from the head, and when the mouths of thoſe Veſſels are vellicated or provoked by any ſneezing Medicine put into the Noſtrils, the Serum is from thence more abundantly drawn out; which yet doth not deſcend from the Brain (as is commonly thought) but is anticipated by theſe naſal arteries, leſt it ſhould go to it; from which when it is more plentifully drained and brought forth by the uſe of Errhines, for that cauſe the Brain becomes more ſerene and exempt from vapours. Then ſecondly, leſt the Brain ſhould be overwhelmed at any time by blood more impetuouſly overflowing, a portion hereof paſſing through theſe veſſels and breaking out, eaſily prevents it.

The Blood flowing forth in too great plenty from theſe Veſſels, is very hurtful.

But ſometimes it happens that an Hæmorrhage of this kind, rather becomes a Diſeaſe than a Remedy; for whenſoever the blood flows out more often and more abundantly than is fit from the Noſtril, if life be not immediately hazarded by reaſon of too great loſs, yet the remaining maſs of the blood being impoveriſhed thereby, and loſing its temper, acquires a cachectick and frequently an hydropick diſpoſition; even as we have clearly intimated before, where we alſo have ſhewn the Ætiologie of this diſtemper in common with other two great Hæmorrhagies, either to conſiſt in the fault of the blood, or of the veſſels, or of both together.

The cauſes of ſuch an immoderate flux.

Firſt, the blood bringing an Hemorrhage of it ſelf offends either in Quantity or Quality; and therefore while occaſionally it boyls up, it cannot be contained within the veſſels, but either opening their mouths by diſtending them, or unlocking them by its acrimony, it skips out: To which happens that the blood being ſometimes diſſolved in its conſiſtence, and as it were infected, becomes unfit to continue the courſe of Circulation, inaſmuch as portions thereof ſeparating from one another, are partly fixed in the fleſh or skin, having ſuffer'd death; and partly breaking out, ſtir up frequently dreadful, and ſometimes mortal Hæmorrhagies, as every where is diſcovered in malignant Feavers, and ſometimes in the Scurvy. Notwithſtanding the blood offending by meer Quantity or Acrimony, unleſs the fault of the Veſſels happening thereon provoke the flux thereof, or too eaſily permit it, ſeldom breaks out into a great Hemorrhage.

1. From the fault of the Blood.

2. From the fault of the Veſſels.

Therefore ſecondly, the veſſels bringing blood, as often as they conſpire to produce that affection, are uſually in the fault, either firſt inaſmuch as their ſmall mouths gaping, by reaſon of the fibres being too looſe and weak, do not readily enough tranſvaſate the blood out of the Arteries into the Veins; which fault happens to ſcorbutick and cachectical perſons; or ſecondly inaſmuch as by reaſon of the ſame moving fibres being affected with the Cramp and Convulſion, the blood being ſnacht impetuouſly to and fro, and chiefly towards the Head, is conſtrained to break out to continue the thread of circulation, even as it will plainly appear in the caſe of a Patient which ſhall be ſhewn below.

Prognoſticks.

1. As to the Prognoſticks, although an immoderate flux of Blood, in the Small-Pox, Meaſles, malignant Feavers, and in the Plague, doth ever preſage evil, and is expedient to be ſtopt, notwithſtanding it ought to be reſtrained not by meer cooling or revulſory things, but to be chang'd by temperate Hydroticks into ſweating.

2. An Hæmorrhage of the Noſtrils, though not great, is more dangerous in Cachecticks with a weak Pulſe, and a cold ſweat, than a plentiful Hemorrhage in men endued with a Pulſe ſtrong enough, and blood very fervent.

3. They who are obnoxious to this Diſeaſe, by reaſon of a Dyſcraſie of blood and looſneſs of the veſſels, if there come upon both theſe a convulſive diſpoſition of the fibres of the little Arteries, they receive a far more difficult Cure and frequently are reduced to extream languiſhings by reaſon of the great loſſes of blood.

4. From thoſe who are feaveriſh, when much blood ſhall flow out of the Noſtrils, and does not terminate the diſeaſe, oftentimes in the place of a Criſis a delirious or a ſoporiferous affection ſucceeds. There are many other prognoſticks about a Hemorrhage accurately remarkt by *Hippocrates*, which notwithſtanding properly belonging to the diſcourſe of a Feaver, we omit in this place; for truly, the Cure in general of this Diſtemper is here almoſt only intended.

About

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About which there will be three primary Indications, to wit, *Curatory*, *Vital*, and *Preservatory*; the two former respect immediately the symptom to be stopt, as often as it shall be urgent; and the last is busie about removing the Cause of the Disease, that so the assaults of the Hemorrhage may be small, or not at all. Besides, an Hemorrhage ought to be handled one way without a Feaver, and after a different manner if pressed with a Feaver.

The Curatory Indication suggests three intentions of healing.

Therefore whensoever without a feaver much blood shall flow out of the Nose, presently as there shall be need of stopping Remedies, there will be three chief intentions of Curing, all being together assumed into practice, *viz.* Let the turgescency of blood be bridled, that it may be less disposed into inordinate tendencies. Moreover in like manner let it be endeavoured, that as well its fluxion being withdrawn from the Nostrils may be diverted to another place, as that the mouths of the Vessels gaping within the Nostrils be shut: for which purpose Remedies as well external as internal very many and of diverse kinds are wont to be exhibited; of the former we will entreat in order briefly.

Outward remedies to stop the flux of blood.

1. Ligatures.

First therefore let the Patient be quiet, plac'd with his head upright, then let many of the Joints of his Arms and Thighs, but not all, be bound with strait Ligatures, which ought now and then to be loosened and removed to other parts; for all being bound together and long, by reason of the blood being held in the outward parts, and too much detained from the heart, hath caused most dreadful swoundings; but otherwise this Remedy being prudently administred, frequently helps. For when the blood by this means running into the members by the Arteries is stopt, that it presently returns not by the veins, its more impetuous spreading it self into the head is impeded. Moreover, by the painful Ligatures of the Joints, the muscular Fibres of the Carodites Arteries are preserved from Cramps which oftentimes come upon them.

2. Bleeding.

Secondly, for diverting the tendency of blood from the Nostrils, it is sometimes expedient to breath a Vein in the Arm or in the Foot. For by how much more blood is carried by the Arteries to the vein cut, by so much less will the afflux be towards the Nostrils. Yet this administration does not always so help, but sometimes a contrary effect thereof happens, as we have already observed in spitting blood. The reason whereof is, that the vessels being suddenly and not sufficiently emptied, suck up again the disagreeable humours formerly ejected, and stagnating within the pores, whereby the blood incontinently is stirred up into a greater eruptive turgescency.

3. Application of cold things.

Thirdly, Cold things applyed to the Forehead and Temples, also to the Nape of the Neck, where the vertebral Arteries ascend, cause the vessels to be bound together, and the flux of blood to be somewhat stopt or repelled. Notwithstanding it is ill which some advise, that cooling Topicks be applyed to the Jugular Veins; for so the blood being retarded in its recourse, flows the more plentifully out of the Nostrils. Moreover, what is usual, to apply linty Cloaths, or a Spunge moistened with Vinegar, to the Pubes and Testicles, helps by no other means than the ligature of the members, to wit, inasmuch as the flowing back of the venous Blood is impeded. A sudden and unexpected sprinkling of cold water on the face, frequently stops an Hæmorrhage, inasmuch as it gives an impression of terror.

4. Cupping-glasses.

Fourthly, Cupping-glasses applyed upon the Hypochondres, Flanches, inner part of the Thighs, and the soles of the feet, are accounted a famous remedy as well with the ancient, as with modern Physitians, for diverting a tendency of the blood from the Nostrils. And the reason is plain, *viz.* because a Cupping-glass being put on, the impulse of air being prohibited by the space of the orifice, and encreased every where about, presently the blood and humours, yea and vapours, and solid parts, being call'd from any other tendency, are driven towards the empty space of the Glass.

5. Frictions.

Fifthly, Rubbing of the extream parts are commended in this distemper by some Practitioners, which we judge not always useful, nay scarce safe; because, although they solicit a greater appulse of the blood to the feet or hands, yet they so hasten the return thereof, that the whole mass of blood being raised into an effervescence, it hazards a more violent tendency towards the Nostrils.

6. Cauteries.

Sixthly, *Zacutus Lusitanus* among his revulsory Remedies, propounds an actual Cautery to the be applyed to the sole of either foot; and *Crato* the bending the little finger of the same side, which because done with no trouble we may try; but we advise not so of the former, unless the way of helping were more certain, which might compensate the pain and lameness, that would ensue thereon.

Seventhly,

Seventhly, Swounding raiſed by any means, preſently ſtops an Hæmorrhage, however contumacious it be; wherefore when ſuch bleeding perſons are taken out of their beds, or when they do timorouſly admit of Phlebotomie, though but ſparingly, or have their members bound for a longer time, or are ſuddenly affrighted with ſome feigned rumour, or by ſome other occaſion fall into a ſwouning or fainting of the ſpirits, the flux of blood ceaſes thereon preſently. The reaſon whereof is evident enough, for that as ſoon as the motion of the heart fails, preſently the blood and ſpirits ruſh thither, and ſo every outward flux is ſtopt on a ſudden, and what was immoderate before, doth not again return.

7. Faintings.

Eighthly, In the laſt place, for repreſſing the flux of blood from the Noſtrils, Remedies ought to be recited, which are ſaid to operate after an occult manner, by Sympathy or Antipathy, of which ſort firſt is the ſympathetick powder, made of Roman Vitriol calcin'd to a whiteneſs by the Summer Sun; alſo a piece of wood cut from a young Aſh firſt ſprouting about the time the Sun enters *Taurus*; the efficacy of which remedy in the late Civil Wars many worthy of credit atteſt to have been approved for ſtopping the Hemorrhages of wounded Souldiers: Yea ſome ſtill with much confidence preſcribe it in all eruptions of blood. I confeſs the reaſons of effects of this kind are concealed from me, if ſo be they happen often. Beſides, it ſeems not a leſs Empirical and irrational Remedy, that a ſilk Bag with a dry Toad in it, worn on the pit of the Stomach, ſtops any kind of Hemorrhage, and prevents its return: unleſs (according to the Ætiology of *Helmontius*) that the application terrifying the *Archæus*, compells the blood being aſtoniſhed, either to go back, or deſiſt from its inordinate excurſion.

Remedies by Sympathy and Antipathy.

1. Sympathetick-powder.

2. Young Aſh-wood.

3. A dry Toad.

There remain very many famous Medicines whoſe Operations are wont to be referred to hidden Cauſes and ſecret vertue; as are Necklaſes of Blood-ſtone hung about the Neck, alſo the moſs of a humane Skul carryed in the hand; Epithemes of the leaves of Nettles bruiſed and applyed to the ſoles of the feet, and the Palms of the hands; the Empirical adminiſtrations of which kind, when they may be adminiſtred without trouble or coſt, we make no refuſal of; ſince in a dangerous caſe every thing is to be attempted; and applications of that ſort do help ſometimes in reſpect that they fortifie the imagination of the Patient.

4. A Blood-ſtone.

5. Moſs.

While ſuch like outward Adminiſtrations are uſed, for repreſſing or calling aſide the flux of blood out of the Noſtrils, alſo other Topicks are put up into the Noſtrils, which may ſhut the gaping mouths of the veſſels, for which uſe the injections of liquid things, Pledgets, Powders to be blown in, and Fumes are wont to be preſcribed, which not helping, in the laſt place we deſcend to Eſcharoticks.

Topicks cloſing the mouths of the Veſſels.

Ninthly, Among Liquids, not only firſt, but as good as all others is eſteemed the ſolution of Vitriol in Fountain-water. Some boaſt this for a great ſecret, and a moſt certain Remedy. Indeed the ſame being applyed to a freſh wound, foraſmuch as it ſhuts the ends of the cut veſſels, by wrinkling them up, it reſtrains and preſently ſtops the flux of blood. But that application in Hemorrhages of the Noſtrils, where the blood being brought to the gaping mouths of the little Arteries, ought to be received by the Veins, in regard it ſhuts them as well or rather than thoſe, it ſucceeds little, and ſometimes not at all, as I have known it frequently experimented. This Medicine is prepared of Green Vitriol, *viz.* of *Hungary*, or of our Country, alſo of the fictitious Vitriol of *Mars* diſſolved in a ſufficient quantity of Spring-water. I know ſome commend the ſolution of Roman Vitriol, which they, not only apply by injection, but alſo to a linnen cloath dipt in the blood are wont to adminiſter it ſympathetically. Moreover the water of the infuſion of white Vitriol prepared with Bole and Camphire, I have known to be uſed ſucceſsfully as well in wounds, as often in other Hemorrhagies.

6. Eſcharoticks. The injection of Vitriol water.

Tenthly, Since water caſt into the Noſtrils, doth not adhere enough to the mouths of the Veſſels, but is waſhed away by the breaking out of the blood, before it can exert its Vertue, it is therefore more expedient either that a Styptick powder be blown in, or that a Pledget dipt in the water of Vitriol, either by it ſelf, or ſtrewed with an aſtringent powder, be thruſt into the upper part of the Noſtril. For this purpoſe many and ſeveral kinds of ſtyptick powders have been preſcribed, I have frequently uſed either *Crocus Martis* calcin'd to the higheſt redneſs, or the powder of Camphorated Vitriol, or the vitriolic Soot ſcrap't from the bottom of an old Braſs Pot, the powder whereof I have often uſed with ſucceſs in this caſe. In obſtinate Hemorrhagies not yielding to other remedies, let Pledgets, whoſe tops are dipt in Cauſtick Colcothar, be put up deep into the Noſtrils, that the mouths of the Veſſels being burnt, and covered with an Eſchar, all flux of blood may be preſently ſtopt. Many other Errhines to ſtop bleeding are accounted famous with Practitioners, as Hogs-dung,

10. Pledgets.

Hogs-dung.

PHAR. Part. II.

Hogs-dung, thruſt into the Noſtrils, which by the meer ill ſavour is thought to repell the blood; alſo the ſmoak of Blood dropping on hot Iron, repercuſs'd into the Noſe, the Powder being burnt is alſo taken inwardly. The moſs of a humane Skull unburied, put into the Noſtrils, is commended by many for this effect: but theſe latter applications ought to be referred to the ſympathetick Ætiologie, if they avail any thing.

Burnt Blood.

Theſe things concerning outward Remedies ſtopping blood, the vertue and efficacy of which ought at the ſame time to be promoted by intern Remedies, ſeaſonably exhibited and cooperating.

Inward Remedies, whereof are two intentions.

Therefore a ſlender Diet being inſtituted, and the Patient ordered to keep himſelf in an upright poſture, or not much ſupine, while the aforeſaid Adminiſtrations are orderly adminiſtred, medicines appropriated to the ſame end are alſo preſcribed to be taken inwardly. There will be two ſcopes of Remedies of this ſort, *viz.* 1. That the effervescency of Blood whether incentive or fermentative being ſuppreſſed, the liquor thereof being reſtrained within the veſſels, may pleaſingly circulate. 2. That the more impetuous motion of the heart driving about the blood too rapidly, may be depreſſed by apt Sufflamina's.

1. Things appeaſing the effervescency of the blood.

1. The firſt Intention requires Medicines that ſuppreſs the too much kindling of the blood, and appeaſe the undue fermentation thereof, for which intents I uſually preſcribe the enſuing Remedies.

Juleps.

Take of the water of Plantane, red Poppy, Purſlain, and frog-Spawn, of each four ounces, Syrup of water-Lillies two ounces, Sal Prunella one dram, mix them for a Julep, the doſe three ounces three or four times aday.

Tinctures.

Take Barly-water two pound, Red-roſe leaves one handfull, Spirit of Vitriol what ſuffices to make it gratefull, or about half a dram, make an Infuſion warm for extracting the Tincture, add Syrup of St. John's-*wort two ounces: the doſe three or four ounces, as oft as they pleaſe day or night.*

Take leaves of ſtinging Nettles, of Plantane, of each three handfuls, pour upon them being bruiſed Plantane-water 6 ounces, preſs them ſtrongly, let the ſtrained liquor be taken.

2. Intention, to cool the motion of the Heart,

2. For the ſecond Intention, to wit, for the cooling of the heart too vehemently beating, Hypnoticks and Opiates are convenient.

Is done by Hypnoticks.

Take water of red Poppies three ounces, Syrup of Diacodium half an ounce, make a draught to take at night. Or,

Take Conſerve of red Roſes an ounce and a half, Powder of Henbane, and white Poppy-ſeeds of each two drams, Syrup of Poppeys, enough to make an Opiate. The doſe the quantity of a Nutmeg every ſix or eight hours.

Take of Laudanum Cydoniatum one dram, the doſe fifteen drops twice aday in a convenient Vehicle.

Of a Hemorrhage in a malignant Feaver.

Theſe things touching an immoderate Hemorrhage, and the Remedies thereof, when it happens without a Feaver: but that which coming in a feaver ought to be ſtopt in regard of the too great loſs of Blood, is either Critical making an immoderate excurſion, by reaſon of ſome accident, for which the Method and Medicines even now preſcribed with caution and reſpect had to the Feaver may be accommodated; or meerly Symptomatical, which being excited in a malignant and Spotted Feaver, Small-pox, Meaſles, or the Plague, neither ſcarcely can, nor ought to be ſtopt with the Remedies above recited. For letting of blood is not convenient, repelling Topicks, alſo cooling Juleps, or Decoctions, and Narcoticks, have no place here: The chief intention of Healing will be to change the Hemorrhage into Sweating, for a gentle Sweat being raiſed, the flux of Blood often ceaſes, if it be not very dangerous.

Remedies.

Take water of Meadow ſweet, Tormentil, of each four ounces, Saxons cool Cordial two ounces, Treacle water an ounce and a half, Acetum Bezoardicum three drams, Syrup of Coral an ounce and a half, Confection of Hyacinths two drams, make a Julep, the doſe ſix ſpoonfuls, every third hour.

Take of the Powder of Toads prepared half a dram, Camphire two grains, take it every ſixth hour, with the forementioned Julep. Or,

Take Powder of Scarlet-cloth from half a dram to two Scruples, as before.

Take confection of Hyacinths three drams, Powder of Scarlet-cloth one dram, Syrup of Corals enough to make a Confection; the doſe the quantity of a Nutmeg every other hour,

Take

Take of Biſtort and Tormentil-roots, of each one ounce, the leaves of Meadowſweet, Pimpernel, Wood-ſorrel, of each one handful, burnt Harts-horn two drams, Shavings of Ivory and Hart-horn, of each two drams, boyl them in Spring-water from three pound to two, adding about the end Conſerve of red Roſes three ounces; the doſe three ounces being ſtrained, often in a day.

PHAR. Part. II.

2. Hitherto of the firſt Indicatiou Curatory, together with the ſcopes of healing and forms of Remedies, appointed for a Hæmorrhage of the noſe happening with or without a feaver. The ſecond Indication Vital only preſcribes a ſlender Diet, temperate Cordials, and a fit handling of the Patient. The Proviſion of the firſt is ſo ſmall and eaſie, that there ſeems no need to appoint a Meaſure and Rules for it particularly. About the latter the chief queſtion is, whether we ought to retain them within or out of their beds. Without doubt the languiſhing, and thoſe obnoxious to often ſwounings, are not to be rouſed up, unleſs (as we have already hinted) it be for a Curatory attempt: as to others leſs weak, it ſeems ſo to be determined. Thoſe whoſe Blood does not eaſily tranſpire by reaſon of the conſtipation of the pores, and is incited into a greater turgeſcence from the heat of the bed, and proner to break out, it will be expedient they not only remain out of bed while bleeding, but alſo ſometimes through extern applications to be cooled in the whole habit of their body, or at leaſt in moſt of their members. Wherefore, *Fabritius Hildanus* relates he ſuddenly cured one of a great Hemorrhage of the Noſtrils, after many things tryed in vain, by putting him into a veſſel of cold water. Alſo with like ſucceſs *Riverius* cured another affected in like manner, being taken out of his bed, and laid on a woollen Matt on the Pavement, he bathed his whole body with Linnen dipt in Oxycrate. Yet this method is not alike convenient for all perſons, or at all ſeaſons; but on the contrary, thoſe whoſe blood is halituous, and enjoying more open pores doth evaporate eaſily, and being wont to be diſſolved by a more moderate heat encompaſſing them, into Sweat, and from thence find themſelves more quiet, it is more convenient that they remain within the bed, not only while the blood breaks out, but as long as there is danger of its return. For this reaſon it is, that many obnoxious to dreadful Hemorrhagies, during the Summer, when they tranſpire more freely, live exempt from that diſeaſe, but the Winter cold preſſing them, by reaſon of their pores being bound up, they ſuffer under more frequent and dreadful Invaſions.

Second Indication vital.

The Poſition of the Sick.

Sometimes in bed, and ſometimes out.

3. The third Indication Preſervatory, which regarding the removing the Cauſe of that diſeaſe, either ſtops the eruptions of blood, or renders the ſame more rare, or leſs, and ſuggeſts theſe two Intentions of healing, *viz.* 1. That the blood being reſtored to its due temperament and mixture, may quietly circulate within the veſſels, without turgeſcency and breaking out. 2. That the Veſſels carrying Blood, as to the ſtructure of their little mouths, and the tenours of the muſcular fibres, may be contained in their due ſtate; ſo that they neither cauſe thoſe inordinate tendencies of blood towards the Head, nor ſuffer effluxes out of the noſe: For both theſe ends, too great plenty and an impurity of the Blood are carefully to be provided againſt by Phlebotomy and purgation ſeaſonably uſed; afterwards for procuring and conſerving its good temperature, the following Alteratives may be given at fit ſeaſons of healing.

Third Indication Preſervatory hath two intentions of healing.

Take of Conſerve of red Roſes, of Hipps, an. three ounces, powder of all the Sanders an. half a dram, Coral prepared one dram, of the reddeſt Crocus Martis *two drams, Sal Prunella four ſcruples, with Syrup of Coral, make an Electuary, take the quantity of a Cheſnut early in the morning and at night, by it ſelf, or drinking after it three ounces of the following water.*

Take the tops of Cypreſs, Tamaris, an. eight handfuls, St. Johns-wort, Tamarisk, Horſetail, an. four handfuls, of all the Sanders bruiſed, an. one ounce, of the Crum of White-bread two pound, ſlice them ſmall, and pour on them of new milk eight pound, diſtill in a cold Still, ſweeten each doſe when taken with Syrup of the juice of Plantane.

Take leaves of Plantane, Brooklime ſtinging Nettles, of each four handfuls, to them bruiſed pour half a pound of the foregoing water, of ſmall Cinnamon-water two ounces, preſs them ſtrong, the doſe three ounces to four, at Nine in the Morning, and at Five in the Afternoon.

Forms of Remedies.

Medicines of this ſort are taken in Spring and Autumn for twenty or thirty dayes, with ſometimes a gentle Purge coming between. In Summer let them drink Mineral Steel-waters for a Month, than which in this caſe there is not a better Remedy. Out of many Examples of perſons labouring with an Hemorrhage, we only propoſe this one ſingular caſe.

PHAR. Part. II.

An Example of a rare Hemorrhage.

I was lately conſulted at a diſtance for a certain Gentleman that had ſuffered frequent and great eruptions of Blood, one while at the Noſtrils, another while at the Hemorrhoid veſſels. He had frequently uſed Phlebotomy by perſwaſion of his friends, without benefit; yea frequently falling into cold Sweats and Swounings after breathing a vein, and notwithſtanding obnoxious to eruptions of blood, he was wont to be much worſe. I preſcribed Juleps (having not yet ſeen him) and cooling Decoctions, and Anodynes, alſo the juicy expreſſions of herbs, and other things cooling the blood, but even from theſe, (as if all ſtill far enough from the ſcope) he was nothing the better. At length being ſent for into the Country to viſit him, I found the affection under which he ſuffered to be meerly or chiefly convulſive; for whereas he daily bled, his Pulſe was weak, the extreme parts cold, and all his Veſſels as being too much emptyed

Its Ætiologie.

fell flat; alſo the Patient was affected with a continual Vertigo and trembling of heart, and by and by with a ſwouning or fear of it. Really the Blood was ſo far from breaking out by reaſon of turgeſcence, that rather the ſtream thereof being depreſſed and ſmall, it ſeemed ſcarce enough to ſuſtain the current of Circulation. Notwithſtanding the truth of the matter was, he was often ſenſible of ſomething in his body creeping one while upward, another while downward like wind, and for the moſt part the flux of blood out of his Noſtrils or Hemorrhoids, followed the tendency of that motion: hence it was eaſie to conclude, that the moving fibres of the Veſſels carrying blood, by which they are contracted, being affected with a Convulſion, did diſorderly convey the ſtream of blood however ſmall and low, to and fro, and ſo compell it into Eruptions: which alſo happen'd the eaſier, inaſmuch as the mouths of the veſſels being laxe and gaping, ſuffered the blood forc'd into them to flow out

His Cure.

without any due reſiſtance. The inſtituted method of Curing did plainly approve of this Ætiology, inaſmuch as it happily ſucceeded, leaning on this ſuppoſition; for Bloodletting, and the uſe of Medicines ſtopping blood being at laſt omitted, I preſcribed the uſe of the enſuing Powder, a doſe whereof he took every ſixth hour with a fitting Julep.

Take the powder of male Peonie, red Coral, Pearles, of each one dram, Ivory, Crabs-eyes, Blood-ſtone of each half a dram, Lapis Prunellæ one dram, make a Powder, the doſe half a dram.

Take of Black-Cherrie water eight ounces, Balm, Barly Cinnamon-water, of each two ounces, Treacle-water one ounce, Syrup of Coral an ounce and a half.

But I commanded that Ligatures ſhould be applyed to certain places by a conſtant courſe, and by and by to other places as occaſion ſhould be given, as well to ſtop as to intercept the Convulſions of the veſſels, and by remedies of this kind, and means of adminiſtration, he recovered his health in a ſhort ſpace, without any return of the diſeaſe.

SECT. III. CHAP. III.

Of Veſicatories.

OF loſing Blood by Phlebotomy, whenſoever it is troubleſome and injurious, and ſwells too much, and tumultuates within the veſſels; alſo of retaining it by Medicines ſtopping Blood, as often as being outragious it rages too much of its own accord and flows out, we have hitherto largely diſcourſed. There remain other certain humours, *viz.* Nervous and Nutritious, as alſo Serous, and other recrementitious ones which are wont to flow within the Brain and Nerves, and as well in the nervous fibres, as the fleſhy, yea and within the Pores of the skin and of the ſolid parts, which being often depraved or hindered in motion, require emiſſion. being otherwiſe about to raiſe great troubles or pains, and frequently dangerous Diſeaſes. Wherefore, that we may ſeaſonably rencounter diſtempers that are about to riſe or take their origine from thence, Phyſick hath found out certain other Emiſſaries, mediately or immmediately deriving the forecited humours out of the parts and places where they ſhall offend. And thoſe are either continual, *viz.* Fontinels of diverſe kinds, which are as it were perpetual Drains, and pour out continually the Ichor;

Ichor; or they are temporary, when as occaſion requires, the Scarf-skin being taken away in ſome part of the body, the extremities of the veſſels in the skin are made naked, and withall ſo provok'd, that they ſpue out in great abundance the ſerous humours of a various deſcent and diſpoſition, and ſo continue to evacuate the ſame for ſome time, one while longer, another while ſhorter. But ſuch a manner of drawing out the ſerous humours from the outward ſuperficies of the body or any part thereof, is wont to be procured by Medicines called by the Ancients *Phœnigms*, or *Sinapiſms*, by Moderns *Veſicatories*: of which in the firſt place we will treat here, (becauſe the knowledge of theſe leads the way to the Doctrine of Fontinels) and we will chiefly inſiſt on unfolding theſe three things; *viz.* Firſt, It ſhall be ſhewn, from what Bodyes, and after what manner diſpoſed, Veſicatories are wont to be prepared. Secondly, Whereas they are of diverſe kinds, it ſhall be declared what is the manner and reaſon of their operation in every one, or at leaſt in the chief of them: Thirdly and laſtly, we will make ſearch for the curing of what ſort of Diſtempers they ought to be appointed, and in what places applyed.

PHAR. Part. II.

Veſicatories anciently called Phenigms and Sinapiſms.

1. As to the firſt, the moſt ſimple Bliſterers are either Fire, or ſolid Bodies, or Liquors endued with fiery particles; (which are ſeldom adminiſtred for this uſe by reaſon of the terror which they impreſs, and the imminent danger, leſt being more ſtrongly apply'd, they do not only bliſter the Scarf-skin, but burn the skin and other parts.) Let therefore what is ſafer and leſs dreadful, Epithemes out of Concretes having more ſharp and (as is affirmed) potentially fiery particles, be applyed to the places to be bliſtered, which are either milder, and by the Ancients were call'd *Phœnigms*, becauſe they made the part red, the Scarf-skin taken away; or were call'd *Sinapiſms* in reſpect of the matter, and were wont to be prepared of Muſtard, Pidgeons-dung, Squills maſht, Garlick, Milk of Figs, and the like; or they were ſtronger, and conſiſted of *Euphorbium*, *Cantharides*, *Flammula Jovis*, Crows-foot, greater Plantane, with many others, which being endued with a certain burning and cauſtick quality, are uſed outwardly, for the uſe above recited, but taken internally, they prove venemous and frequently mortal.

1. Of what prepared.

1. From actual Fire, or things imbued with it.

2. From things potentially burning.

The compoſition and forms of things drawing bliſters are reported to be manifold and of ſundry kinds, although one or two may here ſuffice, and by how much the more ſimple, the better; and in moſt caſes for the moſt part 'tis all one which you uſe: notwithſtanding we ſhall after our manner annex ſome ſelect Preſcriptions of theſe kinds of Remedies. And that we my ſay little of *Dropaces*, *Sinapiſms*, and *Phanigms*, whoſe uſe is almoſt exploded; almoſt all Veſicatories now in uſe have Cantharides for their Baſis.

Take powder of Cantharides half a dram, to a dram, powder of Ameos-ſeeds one ſcruple, of old Leaven kneaded with Vinegar, enough to make a Plaiſter, ſpread ſome of it on Leather, apply it twelve hours to the place to be bliſtered. This works certainly and ſtrong enough: but becauſe it is long compact and ſticking, and may fall from the place to which it is put, or is apt to crumble, therefore for the more commodious application, this following is very convenient, and now in uſe with moſt.

Forms of Veſicatories.

Take of Cantharides three drams, Euphorbium half a dram, powder of Ameos-ſeeds one dram, let be incorporated with Melilote-Plaiſter by a warm hand, as much of this powder as it is capable to receive, then ſpread it on Leather, and apply it for twelve or ſixteen hours.

Some do uſe to incorporate the foregoing powder with *Burgundy* Pitch, and ſpread it upon Leather, afterwards to cover the ſides with red Sanders incorporated with *Burgundy* Pitch, and ſo adminiſter both a Dropace and a Veſicatory. Alſo by applying ſtill the ſame Plaiſter, the Scarf-skin being bliſter'd and taken off, and the place being red, and ulcerated, and only wiping it once or twice in a day, and putting it on again, they cauſe the little Ulcer raiſed by the Veſicatory, to flow at pleaſure, yea ſometimes above a month, and to throw off a plentiful Ichor.

A more delicate Veſicatory with a Dropace.

Others incloſe Cantharides bruiſed, and ſprinkled with Vinegar in Silk, and apply to the place.

Some Empiricks uſe in the room of Cantharides a maſs of the leaves of Crow-foot, or *flammula Jovis* bruiſed on the place, by which the Scarf-skin being bliſtered, or rather eaten, the skin it ſelf, as if toucht with an actual fire, is much inflam'd and deeply ulcerated; whence not only profuſion of Ichor but an inflammation of the whole member, and a feaveriſh diſpoſition ſometimes follow: wherefore theſe things are not to be uſed raſhly.

2. If it be enquired of the manner and reaſon how theſe and other Veſicatories operate; in the firſt place we ought to ſhew by what manner actual Fibres, and things endued

2. How they operate.

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endued with particles proceeding from Fire, do raiſe a bliſter; then by an eaſie Analogy the force and manner of working of thoſe ſorts of remedies will be known, which are reported to be endowed with a potential fire. Wherefore we obſerve of the former, that the fiery particles not being too vehemently applyed, penetrating the Scarf-skin without diſſolution of unity, enter under the skin it ſelf, where the extremities of the veſſels bringing blood, of the Nerves, and of the nervous Fibres are terminated; and there do variouſly twiſt together theſe, altering them from their poſition, and pervert the ſtructure of the whole texture of the skin: inſomuch that from all the veſſels being made angry in a high degree, the watery humour being imbued with igneous particles, and therefore rejected, as well by the blood as by the nervous Juice, is ſpued out in great abundance: This Lympha, becauſe it cannot paſs through the Scarf-skin, ſeparates it from the skin, and raiſes it into a bladdery bulk, from which at length being broke of its own accord, or occaſionally, it flows out. Moreover as long as the igneous particles adhere to the skin, and the mouths of the Veſſels, being covered with an Eſchar, are not cloſed up, theſe being continually twitched by them, do continue to ſpue out the Ichor. This kind of ichorous flux will the ſooner ceaſe, if immediately upon the hurt inflicted, the fiery particles be drawn out, by the application of ſome proper Antipyretick, as Fire it ſelf, Nitre, Soap, Onions, and the like. Moreover it runs the longer, if omitting an Antipyretick, medicines hindering the generation of a Cicatrice, or of the outer-skin, and unlocking the mouths of the veſſels, be worn upon the place affected.

Shewed by the example of Fire.

How Cantharides excite Bliſters and draw forth water.

By theſe it is eaſie to underſtand by what manner Veſicatories perform their operation, *viz.* Cantharides (as likewiſe any other of the ſame vertue) being outwardly applyed, and being heated by Effluvia's of the parts ſubjected, and ſo being provok'd to exert their power, do plentifully diſpatch ſharp and as it were fiery particles from themſelves, which penetrating the Scarf-skin without any tearing it, they are daſhed againſt the *Cutis* or other skin, where firſt they act upon the Spirits, and then by the affecting theſe, upon the Humours and ſolid parts. They very much provoke the Spirits, and drive them into painful Convulſions of the Fibres, diſſolve the Humours, and conſtrain them to ſeparate into parts, ſo that the watery part being very much embued with thoſe ſharp, and as it were venemous particles, is rejected every where by the other Juice; and when in the mean time the ends of the Veſſels and Fibres are either eaten by the burning, or opened by twitching, and as it were drained, that Ichor conveying the hurtful particles is plentifully ſpued out of their little mouths; which then ſeparates the impervious *Cuticula* or the Scarf-skin, from the other skin or *Cutis* it ſelf, and raiſes it into a little bladder, and after this being broken and taken away, it is for ſome time poured out by the ulcerated skin (as we ſhewed it to come to paſs by reaſon of the particles of fire.)

But this is not only done, becauſe the ſerous Juice imbibing the ſharp parts of the Medicine, and conveying them out, doth not alwayes bear them all back the ſame way by which they entred, but ſometimes this being endued with theſe ſtings, regurgitates into the maſs of Blood; and afterwards being circulated with it, and ejected with its infeſtous burden through other Emunctories, offends ſome weak or tenderer Channels in its paſſage or going forth; from whence very many contract a Strangury, from great or many Veſicatories, by reaſon of the urinary paſſages being affected for that cauſe with Acrimony or Eroſion, which in ſome becomes moſt ſharp and intolerable. Alſo that application ſometimes brings bloody Urines to others afflicted with the Stone; hence a ſuſpicion alſo ariſes, that thoſe who have tender Lungs, or who are ſubject to a Conſumption, are much endangered by this Medicine outwardly applyed; which notwithſtanding I have not known happen to any; but can rather atteſt by frequent experience on the other ſide, that it redounds to advantage rather than hurt. For the more ſharp particles of Cantharides, if they be long applyed, being ſometimes imbibed more plentifully by the blood, infect its whole Serum: which Juice ſo ſharpened, as long as it is confounded with the Balſamick blood, hurts no part; but being ſeparated from it by the Kidneys, it ſometimes brings hurt to them, and frequently not only twitches the neck of the Bladder by its Acrimony, but ſometimes corroding it, cauſes filth, and little skins, nay and blood to come away: but in the maſs of blood, the ſame more ſharp, ſaline-volatile particles do often moſt notably help; inaſmuch as they deſtroy the fixt or acid Salts in it, and unlock the conſiſtence of the blood too much bound up, and ſo do cauſe the ſerous and other morbific recrements before wrapt up with it, to be ſeparated from it, and to be more eaſily diſpatched by Urine and Sweat; hence Veſicatories being applyed long in Feavers do call forth plentiful Urine and a more eaſie Sweat. Alſo they open the obſtructed wayes, and move together the portions of Blood or Serum

Why they bring a fervent Dyſurie.

Veſicatories move Sweat and Urine.

Serum, ſtagnating or being extravaſated in any place, and reſtore them to their Circulation. Wherefore they are not uſed only to help in ſerous maladies, but alſo in thoſe of the blood, yea in a Pleuriſie, Peripneumonia, and in any other Feavers.

Having hitherto ſhewed after what manner Veſicatories operate firſt on the Spirits and then on the Humours and ſolid parts, it is now our buſineſs in the next place to ſhew both the good and evil effects of them, as alſo the manners of uſing them. But that they in the firſt place operate on the Spirits is manifeſt from hence, that they exert no Power on the diſeaſed, and it is an ill Omen in thoſe that are languiſhing, when Veſicatories have no operation, becauſe it is an Indication that the Animal Spirits are much dejected, or abundantly diminiſhed.

The effects of Veſicatories.

Therefore, it behoves to conſider about the due unfolding the energy, force or virtue of this remedy, what humours it either immediately or mediately evacuates or alters; and afterwards in what Diſeaſes, and bodies how diſpoſed it either profits or hurts.

1. *As to humours of the Skin.*

Firſt, As to the former, the humours that are immediately ſent out by a Veſicatory, drop forth partly from the pores and glandules of the Skin, and partly out of the mouths of the little Arteries, and partly out of the extremities of the Nervous fibres; perhaps ſome little of the Juice newly received, out of the mouths of the veins, though not much, ſeems to be carryed. The humours mediately drawn out by a Veſicatory are thoſe which the aforeſaid parts being emptyed receive elſewhere, and derive them forth.

1. The Skin is a thick Membrane conſiſting of a double Coat, very porous, alſo thick ſet about with moſt numerous glandules, with fat, as alſo the ends of the Veſſels and fibres being terminated therein, and thickly woven one within another. Wherefore, while a portion of it is made bare, the Scarf-skin being taken off with a Veſicatory, and the nervous fibres being twitched, do bind together, and wreathe the glandules and pores, the ſerous humour contained in both, is moſt plentifully ſqueezed out. And whereas ſome pores are previous into others, the Serum doth not only flow out of the place bliſter'd, but ſometimes into the little holes firſt ſo emptyed, a portion of the Serum coming from the neighbouring pores ſucceeds, and thence by and by ſweats out: wherefore in Patients affected with an Anaſarca, the little ulcers raiſed by a Veſicatory, exhauſt the waters every where in great plenty, and draw them out of the neighbourhood, yea and ſometimes at a great diſtance.

2. *In reſpect of the blood.*

2. The little mouths of the Arteries being uncovered and twitched about the bliſtered place, do not only vomit out a portion of the Serum brought to them, by ordinary cuſtom, but the ſerous liquor being imbued with the Stimula of the medicine in the whole maſs of blood, immediately is ſeparated more plentifully from the blood; and at every turn of Circulation a greater plenty thereof is thrown out by the ſame mouths of the Arteries continually irritated: Moreover together with the Serum as it were ſo ſtagnating, and therefore removed from the whole blood into the little ulcers of the skin, other recrements and ſometimes the morbific matter it ſelf depart in plenty, and are diſpatched forth by the ſame Emiſſaries; and for this reaſon in malignant feavers, yea in ſome putrid, that are difficult to be judged of, when the recrements and corruptions of the blood, unapt to be thrown off, do threaten the Præcordia or Brain, Veſicatories continually and leiſurely draining it, do frequently yeild notable relief; whereunto we may add, that they do alſo alter and reſtore (as we before mentioned) the blood degenerated or depraved as to its Salts, and alſo by opening or ſubtilizing its conſiſtence, diſpoſe it towards an Eucraſie; wherefore, not only in a feaveriſh ſtate of Blood, but alſo in a ſtate otherwiſe peccant, or of ill Juice, this kind of remedy is often extreamly convenient.

Which they purge and alter.

3. *In reſpect of the Nerves and of the humours abounding in them and in the nervous parts.*

3. Both reaſon and experience have enough proved, that Veſicatories evacuate a certain humour from the Nerves and nervous Fibres, and for that cauſe profit very much in convulſive diſtempers: For ſurely we have in another place clearly enough demonſtrated, that the watery liquor of the Brain and Nervous ſyſtem, doth ſometimes abound with heterogeneous Particles. Alſo it is manifeſt by frequent and familiar obſervation, that the impurities and recrements of that liquor, together with the watery Juice, do ſpontaneouſly ſweat out from the Nerves and Nervous Fibres, when the fluor is raiſed, and either reſtagnating within the maſs of blood, are carryed off by Urine or by Sweats, or being depoſited within the Cavities of the bowels, are diſpatched by Vomit or Stool. Wherefore, when a Veſicatory is applyed, the extremities of the Nerves and Nervous Fibres being made bare, and very much angred, immediately a humour abounding near their ends is voided; and alſo the whole Juice planted within their paſſages by a long ſucceſſion, is chafed, and delivered from

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from stagnation; and the heterogeneous particles mixt with that nervous Juice, being every where agitated and derived from the Brain, slide towards their newly opened Emissary, by degrees, and at length are removed wholly forth.

For the curing of what Diseases Vesicatories are convenient.

From these things we may collect, for the cure of what Diseases this kind of remedy doth chiefly conduce; for by reason of its evacuation out of the pores and glandules of the skin, as often as any serous, salt, sharp, or otherwise hurtful humour is collected in those parts, or their neighbourhood, and being excluded from the Circulation of blood, shall obstinately stick in that place, surely there is no more ready or easie way afforded for drawing it forth, than by applying a Vesicatory, upon or below the place affected. Wherefore, it is not only indicated by an Anasarca or by any foulness or eruptions of the Skin, but moreover a Vesicatory is required for pains either arthritical or scorbutical, fixt any where in the extern habit of the body, or in any certain member.

1. In all cutaneous Distempers.

2. They take away the impurities and ill temperament of the blood.

Secondly, In respect of the Blood, Vesicatories are always used in malignant Feavers, as well to purge out leisurely any heterogeneous or morbific matter, as to change it from a disposition either too acid, or salt, or otherwise peccant, into a right temperament; yea they are of most excellent use in all putrid feavers of ill habit and hard to be judged of. Also for that cause in the Scurvy, Leucophlegmatia, *Pica Virginum* or Green Sickness, also in any other ill habit of body, this kind of remedy affords frequently notable help. Moreover not only for the sake of correcting the blood it self, but besides as often as it being depraved spreads its corruption on other parts, and so doth first beget diseases in the Head, the Chest, the nether Belly, or Members, and then excites their Fits, Vesicatories are usually exhibited with success. Wherefore it is a common remedy, in Head-aches, a Vertigo, and soporiferous affections, no less than in a Catarrh, or any defluxion either into the Eyes, Nose, Palate, or Lungs, in which every one without consulting a Physician, will prescribe to themselves Cantharides for Revulsion. I confess, when I have often been surprized with a great Cough, with abundant and thick Spittle (whereto I am originally obnoxious) I have received relief from no other Remedies more than from Vesicatories; wherefore I am wont, while that distemper doth urge, to apply Medicines drawing blisters first upon the Vertebra's of the Neck, then those little Ulcers being healed, beneath the Ears, and afterwards if need require it upon the Scapula's; for so the serous filth loosened from the consistence of the blood sweating forth, is derived from the Lungs, and also the mixture of the blood sooner recovers its temper, inasmuch as after this manner its enormous salts are destroyed.

This Remedy is profitable in those Diseases which the blood produces in other parts.

3. Also in all Distempers of the Brain and of the nervous Stock.

Thirdly, In respect of the Humour, *Epispasticks*, as they are of most common use, so they are wont to confer great help, in soporiferous, convulsive and painful distempers, for deriving and evacuating it out of the nervous stock and the brain it self. Was ever any surprized with a Lethargy, Apoplexie, or Epilepsie, but that immediately Friends and Attendants however unexpert, have tormented his Hide with the application of Cantharides? In stupendious convulsive motions, ascribed usually to nothing less than Witchcraft, I have applyed Vesicatories with great benefit in many parts of the body at once, and I have continued them above a Month, presently renewing them in fresh places. And also pains that are fixt and most fiercely tormenting in the membranous parts, are seldom cured without this administration. For sometimes morbific humours and Particles which being deeply radicated, yield nothing at all to Purgers or sweating Medicines or Diureticks, yet have seemed to have been pulled up by the roots by Vesicatories, as it were remedies laying violent hands on the disease.

For what diseases, Vesicatories are intended.

But this Remedy although most general is not used to operate so easily and happily in some Diseases and Constitutions; wherefore we may not rashly or indifferently use it towards all persons. For those who are Nephritick and obnoxious to a frequent and painful Strangury, scarce ever endure the application scot-free; wherefore, on those that are so affected we must not use Vesicatories, unless in malignant Feavers or acute Cephalick Diseases, for avoiding the greater Evil.

In what Constitutions they agree best.

As to what relates to the various Temperaments and Constitutions of men in respect of which Vesicatories are used to be more or less convenient or advantageous: Concerning these, this threefold notable difference occurs. In the first place, some persons for the most part endure well the use of this Medicine, and the little Ulcers raised thereby in the skin, sweat out an Ichor sufficiently plentiful without any Dysurie, or great inflammation of the place blistered; and then heal of their own accord; which effect succeeds only in blood of a good temperament, where, to wit, the Salt and Sulphur being moderately and rightly constituted, there is present and abundant plenty of Serum; whose Juice easily and more largely separating from the rest

of

of the blood, carries away the ſharper particles of the Medicine imbibed with it ſelf, and partly ſweats them out through the place bliſter'd, and partly conveys them out without prejudice by the Urinary paſſages; therefore alſo the advantagious effects now recited are produced in the maſs of blood.

Alſo in whom not.

2. But ſecondly this remedy with ſome doth neither well agree, nor operate profitably; becauſe it rubifies the place very much to which it is applyed, or rather excoriates it with moſt fierce pain and great inflammation; notwithſtanding the little ulcers made in the ſame place, although they do for ſome time torment the Patient, yet pour out very ſmall or ſcarce any Ichor: Alſo to theſe always bliſter'd with torment, for the moſt part a violent Strangury happens. The uſe of theſe Veſicatories being troubleſome and unſuccesful, doth frequently happen to men of a cholerick and hotter temperament; whoſe blood is endowed with a plentiful Salt and Sulphur, and a ſmall quantity of Serum, being more throughly concocted with the reſt. Wherefore, when the Juice that ought to carry away the more ſharp particles of the Medicine, doth neither eaſily nor plentifully paſs from the reſt of the blood, (that it may ſpeedily waſh them out) thoſe particles ſticking ſtill in the skin, do as it were infect and impoyſon the blood it ſelf, paſſing thorough, and for that cauſe being impeded from its circuit, they cauſe it to ſtagnate, and to be gathered together about the extremities of the Veſſels, whence they are inflamed. Moreover the ſerous Juice being ſeparated by the Kidneys when of it ſelf it is little and ſharp, and beſides becomes ſtinging from the particles of the Medicine, it irritates the Neck of the Bladder, and frequently corrodes it by its acrimony.

In men of a more hot temperament they torment the part, and do not draw forth the water.

In others, inaſmuch as they draw forth too much Ichor, they are not profitable.

3. There remains a third Caſe although more rare, relating to bliſtering, to wit, in whom little Ulcers being raiſed in the skin, preſently pour out the ſerous humour in ſo great abundance, that in a little time it will be neceſſary to give repelling Medicines, and that ſhut the mouths of the Veſſels; otherwiſe, from too much flowing out of waters, a diſſolution of ſtrength, and a fainting of the Spirits are in danger to enſue. This I have known ſo conſtantly happen to ſome Patients, that afterwards I was fain to reſtrain their uſe of Cantharides although there was need of them; the reaſon whereof ſeems to be, that the blood being endowed with a ſalt Serum, and more ſharp than it ought to be, hath a conſiſtence too eaſily diſſolved: wherefore, that ſerous juice being ſharp, and fretting of it ſelf, as ſoon as it is provok'd by the particles of the Medicine looſening the conſiſtence of the Blood too eaſily diſſolv'd, immediately breaking out with violence from the maſs of blood, whereſoever there is a paſſage afforded, it flows out with a full torrent through the mouths of the veſſels gaping in the bliſtered place. Beſides this too much flowing out of the Serum, raiſed from the firſt application of the Veſicatory ſometimes happening late in malignant Feavers, and in others ill, or not at all judged, and remaining a good while, wholly conſumes the morbific matter, and delivers the Patient from the jaws of Death. In ſuch a Caſe after the little Ulcers for the firſt days have poured out little or a very ſmall quantity of Ichor, at length Nature attempting a Criſis by this way, a vaſt Illuvies of Serum flows out from the ſame, and ſo ſometimes for many dayes, nay weeks, continues to flow out until the Patient before accounted deſperate, recovers his entire Health. Little Ulcers ſo abundantly flowing, as it is not eaſie, ſo it is not ſafe to ſtop them before the whole Mine of the Diſeaſe be conſumed. Not long ſince, a famous Doctor of Phyſick in *London*, ſcarcely recovering from a malignant Feaver, did copiouſly ſweat out Ichor daily from places bliſtered in ſeveral parts of his body; after ſome time (they being troubleſome and tedious) he did apply ſtronger Repercuſſives to them all, and immediately reſtrained their flux. Thoſe fluces were ſcarce two days ſtopt, but his diſeaſe revived, and on the ſudden he was affected with fainting of Spirits, and often ſwooning, a cold Sweat, and a low weak Pulſe: and whereas he could not be relieved by any Remedies, however cordial they were, he dyed within three days; the cauſe of which ſeems to be, that the malignant matter being ſuddenly repercuſſed, fell into the Cardiac Nerves, whoſe action being hindred, the vital function quickly failed:

The ulcers of Veſicatories do ſometimes plentifully flow in Feavers, and give Judgement of the Diſeaſe.

They are not to be cured.

An Example is ſhewn.

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Of Fontinels, or Iſſues.

Iſſues rather a preſervatory than curatory Remedy.

BEſides Veſicatories, which being as it were the extemporary Emiſſaries of the Serum, and other humours externally to be brought forth, are only raiſed upon ſome occaſions, and then after their efficacy a little ſhewed, are permitted to be dryed up; there are others eſteemed as it were continual Fountains, therefore named *Fonticuli* or Iſſues, out of which the Ichor or ſerous humour flows with a conſtant Spring. Thoſe former, as they are requiſite for the moſt part for Cure-ſake in acute or other Diſeaſes, whoſe morbifick matter requires a quick diſpatch, in the firſt place reſpect the conjunct cauſe of the Diſeaſe to be removed; and therefore being more broad, are made only ſuperficial, that ſuch little Ulcers being large, may evacuate much, and then eaſily be healed: but on the other ſide, Iſſues being chiefly indicated for preſervation, are ordained to remove or vanquiſh the procatarctick cauſe of the Diſeaſe: wherefore they conſiſt of a more narrow orifice, but made more deep through the thickneſs of the whole skin, to the end, that while they ſend out the morbifick matter in leſſer quantity, they may derive it further, and continue longer to purge it out.

About theſe three things are to be enquired into.

There are three chief heads of diſquiſitions concerning Iſſues, *viz.* Firſt, what humours theſe Emiſſaries chiefly evacuate, and whence they bring them: Secondly, in what Diſeaſes or Conſtitutions they better or worſe agree: Afterwards, Thirdly, in what places, in what form, and with what inſtruments they ought to be made.

1. *What humours they evacuate.*

1. As to the former, Iſſues, like Bliſters, purge out all humours fixt within the skin, (although in a leſs compaſs,) or brought through it as well by the ſanguiferous, as nervous Veſſels, not only as they provoke, or as it were ſuck the outer ſuperficies of the skin, but by piercing through the whole hide or skin, they convey out whatſoever flows from the ſides of the orifice through the broken Veſſels, alſo whatſoever ſlides down elſewhere beneath the orifice. Wherefore not only humours accumulated within the pores of the skin, or glandules, or brought thither by the Arteries, or Nerves, have conflux to Iſſues; but moreover the ſerous recrements under the skin, that are wont to be transferr'd, or creep between the interſpaces of the muſcles and membranes from place to place, tend every where unto them and find paſſage. Moreover an Iſſue appointed in the way anticipates morbifick humours, which were formerly wont to be conveyed to other weak and long afflicted parts, and by ſuch means exempts one while this part, another while that, from their invaſion. Hence either a Gouty, or Nephritick, or Colick matter, and ſometimes a Paralytical, or otherways ſcorbutical, are frequently intercepted by Fontinels, in their paſſage from their Source to their neſts or places of reſidence, and ſo are conveyed forth, and the uſual aſſaults of a diſeaſe declined: Neither doth this Emiſſary leſs purge from thence by drgrees the humours impacted in any part or region of the body, and there cauſing prejudice, than water-furrows made for derivation of moiſture, and ſo prevent or cure a ſickly diſpoſition.

2. *In what diſeaſes they chiefly prevail.*

2. From theſe ſeveral accounts of aſſiſtance, whereby Iſſues in general are wont to help, it is eaſily collected, for what diſtempers they are chiefly required; for although there is ſcarce any diſeaſe happens, wherein this remedy is either hurtful or unprofitable, notwithſtanding it ſeems rather more neceſſary in ſome caſes than in others. It is commonly preſcribed for almoſt every diſeaſe of the head, whether outward or inward: Every one of the ordinary people procures an Iſſue as equal to all other Remedies, for the Convulſions of Infants, or Youths, for Sore-Eyes, Kings-Evil, as alſo for Head-ache in perſons adult or ancient, for drouſie, vertiginous or Cramp-like diſtempers. Neither is it leſs celebrated againſt diſeaſes of the Breaſt; As who is obnoxious to a Cough, bloody or conſumptive Spitting, or an Aſthma that long enjoys his skin whole? In like manner Iſſues are commended in affects of the lower Belly; ſcarce any Hypochondriacal perſon or Hyſterical woman, in like manner no Gouty or Cachectical perſon, but hath his skin pierc'd in many places like a Lamprey. It would be a vaſt work to recount here particularly all the Diſtempers for which Fontinels are helpful.

3. *In what Bodies they agree not.*

3. But really this Remedy, however advantagious and benign of it ſelf, does not agree with all perſons, nor is it indifferently to be preſcribed to every one. For there are two ſorts of men, which though ſick, are to be excuſed from Iſſues, inaſmuch as

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as this Emiſſary evacuates too much in ſome, and too little in others, or leſs than is convenient; and in the mean while remains very painful and intolerable.

Sometimes a Fontinel is not convenient, becauſe it too much evacuates or conſumes the Humour or Spirits. For I have obſerved in ſome, that an Iſſue made in any part of the body, pours out an immoderate quantity of Ichor, and peccant in quality: for out of it by often turns, if not continually, a watery, thin and fetid Juice, oftentimes diſcolouring the Pea and Coverings with blackneſs, flows out in great abundance, and ſo the ſtrength and fleſh is impaired by too great an Efflux thereof.

Viz. *Firſt where they evacuate too much.*

The reaſon whereof ſeems to be this, that in ſome perſons endued with an ill diſpoſition of blood and humours, a wound being made and hindred from healing up, degenerates ſtraight ways into a filthy and malignant Ulcer; the ſides whereof put on the nature of acid corruptive ferment, whereby the portions of blood continually forced thither, are ſo tainted and diſſolved, that the Serum thereof imbued with the diſſolved Sulphur, and other Corruptions, being refuſed by the Veins, flows out there copiouſly. Moreover, this putrifying pollution of an Iſſue being communicated to the blood, depraves in ſome part the whole maſs thereof, and ſo at leaſt (as alſo by too much loſs of the ſerous Juice) it is rendered leſs nutritious: Beſides, from the Sulphur of the blood diſſolved near the ſides of the Iſſue and flowing out with the Serum, the ſtreaming Ichor doth ſo ſtink, and black the Covering. Sometimes an Iſſue pouring out the ichor not immoderately, conſumes the ſpirits and ſtrength more than it ought, which really we take cogniſance of from the effect, and ſometimes not till afterwards; inaſmuch as ſome, while they bear about them one or more Iſſues, remain feeble and lean; but they being ſtopt preſently become vigorous and more plump. Moreover, it is a common obſervation, that many from an Iſſue raiſed near the head, have been preſently ſurprized with a certain defect, and weakneſs of ſight, inſomuch that they have been conſtrained immediately to heal it up: which ſeems to happen for this cauſe, for that where the proviſion of ſpirits is ſmall, and their conſiſtence very thin, the ſmall loſſes of them, or of the Juice from whence they are procreated, if ſo be they are conſtant, are difficultly endured.

Why they often pour out the humour too much.

Why they expend the Spirits too much.

But in another and different reſpect, Iſſues like Veſicatories are forbid to ſome, or very cautiouſly preſcribed, for when they evacuate little or nothing at all, they very much vex the place, where they are made. For in perſons endued with a cholerick, or hotter conſtitution, the maſs of blood being thicker than it ought to be, and leſs diluted with Serum, becomes more bound in its conſiſtence; in theſe the ſolution of Continuity being made and kept by reaſon of the Iſſue, the blood it ſelf (for that it doth not ſufficiently diſcharge its Serum, whereby it may go away) ſticks in the paſſage, and ſo being extravaſated, cauſes a very painful inflammation; and in the mean while, as it pours out little Ichor, it remains as well unuſefull as troubleſome. The operation and uſes of Fontinels and their indications being deſigned, we ſhall ſhew in what place, in what form, and with what inſtruments they ought to be made, and after what ſort to be managed.

Iſſues are likewiſe incouvenient when they evacuate leſs than they ſhould do.

The places are appointed according to the ends or intentions of Curing by them, which chiefly are theſe three, *viz.* 1. A general Evacuation of humours from the whole body. 2. An Evacuation and alſo a revulſion from ſome particular member. 3. An Evacuation and alſo a derivation from ſome particular member. In reſpect of the firſt it is expedient that an Iſſue be made in the left arm; The ſecond Intention requires it far from the part affected, and the Third near the part.

The places of Iſſues are deſigned, according as the ends are Evacuation General, or Secondly, Evacuation and Revulſion, or both that and derivation.

For theſe ends, *viz.* one while for this, another while that or the other Fontinels are made in all parts of the Body, *viz.* in the Head, Breaſt, Abdomen, in the Arms and Thighs, and in moſt parts of each of theſe, either by Inciſion, or Cautery, or piercing through, and in their holes or orifices Peaſe, or wooden Peaſe, Pellets or Pledgets, are put to keep them open. We will obſerve the principal places and kinds of Iſſues by running through the members of our body.

1. A Fontinel is preſcribed by ſome to be burnt by a Cautery in the Coronal Suture, and is commended for exhauſting and evacuating humours out of the brain and its outer Coverings. Although ſome uſe this in familiar practice, yet I have found by experience in ſome it doth leſs happily ſucceed, inſomuch that I have ordered many Iſſues to be ſtopt that have been made on the top of the head, being inſtructed herein from Reaſon and Experience; for that the blood transferrs more feculency towards the place where it was wont to lay aſide its recrements, and depoſites them in the whole vicinage, and chiefly in the part affected, (as being the weaker and more ſuſceptible part) whence a Diſeaſe is oftner augmented than cured. For the ſame reaſon, *viz.* for the derivation of the humours from the inner head outwards,

1. *In the Coronal Suture.*

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ſome form Iſſues in the fore-part of the Head over the ſagittal Suture, others in the hinder part of the Head about the beginning of the Lamboides, but the ſame exception remains againſt both as the former. And doubtleſs more rightly doth an Iſſue in the Arm anticipate the morbifick matter that is wont to be depoſited about the head, or makes revulſion in the Thigh, and raiſed a little beneath the head, derives from thence. For this reaſon in painfull diſtempers of the brain, and Meninges, we cut a deep hole in the Nape of the Neck in Children and Youths; but for thoſe grown up, and Old men, we apply Cauteries on either ſide the Spine between the Shoulders or the Homoplates, and in the ſame places we make inciſion for two Fontinels capable of many Peaſe, often with very great ſucceſs. As to holes cut or burnt behind the Ears, or a Seton with a skane of Silk drawn through the Lobes thereof, I have ſeen them rarely with any ſucceſs, but often very troubleſome: Inaſmuch as a ſolution of Unity made in theſe places, neither diſcharges much Ichor, nor for any long ſpace; for though the hole or orifice be fill'd with a Peaſe, or Pill, it will be covered in ſpite of all endeavours to the contrary by the Cuticula, or skin growing under.

Iſſues in the fore and hinder part of the head.

Between the Shoulders.

Iſſues in the back do notably help diſeaſes not only of the Head by Evacuation and derivation of the morbific matter, but alſo in all Gouts, Stone and Colicks, by anticipating the fuel of the Diſeaſe, and by intercepting it while it tends to its ſeats: which really is plainly proved by experiments and obſervations taken from the help of the Patients.

Which are profitable in many diſeaſes.

Fontinels between the Shoulders, alſo in the Arm or Thigh, conduce to the evacuating or anticipating, in pectoral Diſeaſes, the humours flowing to the Lungs, and to the drawing back thoſe depoſited there. How an Iſſue cut in the Cheſt between the Ribs doth ſometimes more immediately derive the conſumptive matter from the Lungs, we have elſewhere ſhewed.

The Region of the Abdomen ſeems unapt for bearing an Iſſue in any part thereof; notwithſtanding the practice of ſome, although it be more rare, is much fam'd for a large Iſſue capable of many Peaſe to be burnt with a Cautery upon the Region of the Spleen for any hypochondriac affection. I have known it of ſmall benefit to ſome, at leaſt not recompenſing the trouble and pain of ſuch a remedy.

An Iſſue in the left Hypochondrion.

Some time ſince I ſucceſsfully cured a weakneſs in the Loyns obſtinate to all other remedies, by a Fontinel in the Groin, and in another Patient an inveterate Sciatica. For ſurely the glandulous Emunctories ſettled in that place, do imbibe very many recrements of the blood and nervous Juice; which if they be throughly and continually diſcharg'd from them by a fit vent, it will much conduce to exempt the contiguous parts from any morbifick Mine.

In the Groin.

The Thigh being a member ſoft and large in bulk, ſeems apt enough for enduring many and great Iſſues, to wit, thoſe which may purge away plentiful humours from the whole body. Yet it doth not ſucceed ſo with many Patients, partly becauſe of its figure too much declining, like a Cone invers'd, the Ligature containing the Peaſe in the orifice is not eaſily kept on, and partly becauſe a ſolution of the Unity being made among the concourſe of ſo many Tendons, it frequently becomes inflamed and painful; inſomuch that ſometimes it hath been neceſſary that it ſhould immediately be ſtopt up, to withdraw the trouble of pain and of lameneſs. Notwithſtanding it ſucceeds better in ſome Patients, for that an inflammation doth not always enſue upon the place where the inciſion was made, and that the Ligature has remained immovable to thoſe that tye their hoſe above the knee.

In the Thigh.

Moreover, as concerning Iſſues, it is requiſite to chooſe a convenient place not only in the body, but alſo in the very member where inciſion is made, which chiefly calls for the judgment of an expert Phyſitian or Chirurgeon; for careful proviſion muſt be made, leſt a Cautery or inciſion be made upon, or too near the Tendons or greater Veſſels; but let the Fontinel be made not in the very body of the muſcle, but in the interſpace or diſtance between the muſcles where the orifice, as *John Heurnius* learnedly obſerves, ought to paſs through the whole skin ſo far, untill the little membrane of the muſcle underneath be penetrated. Wherefore this part of Chirurgery is not raſhly to be allowed to Quacks and others ignorant of Anatomy, for that from this being ill done, not only a fruſtration of the benefit, but from thence frequently great miſchief happens, and ſometimes to the hazard of life.

A fit place in the member to be choſen that it may be made far from Veſſels and Tendons.

It is not needful to deſcribe the figure and uſe of the cutting Inſtrument, together with the manner of preparing and compounding Cauſticks for making Iſſues, inaſmuch as it is notorious to the common people; yet it behoves us to handle in what manner the ſymptomes which happen to theſe Emiſſaries after they are made, may be cured, and it will not be beſides the matter to diſcourſe, what do either impede or pervert their powers.

Symptoms accidental to Iſſues how to be cured.

Whereas

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Whereas many and ſeveral diſtempers happen to Iſſues, help is not required for them all, but only for ſuch as are of greateſt moment: Wherefore there will be need of help. 1. Whereſoever an inflammation enſues upon the part or place where it is. 2. If the Orifice vent more or leſs Ichor than it ought. 3. If the Ulcer ſhall be apt ſpontaneouſly to be dryed up, and cover'd over with a skin: or if it be prone to abound with ſpongious fleſh growing about the ſides. As to leſſer faults, as when the Ulcer ſhall break forth into frequent Hemorrhagies, or change its place creeping into another leſs convenient, with many other ways by which it prevaricates, it will not be worth our labour to diſcourſe here.

What chiefly require help.

1. An inflammation frequently happens to an iſſue, and that ſo painful ſometimes, that it threatens a Sphacela, yea and ſometimes cauſes one. But ſuch an affection enſues either upon the orifice new made, or happens afterwards by reaſon of the blood and humours, occaſionally agitated and ruſhing frequently and in heaps to that part.

1. Inflammation.

When a Fontinel is made, immediately by reaſon of ſolution of the Unity, and conſequently by reaſon of the circuit of blood ſomewhat hindred in that place, a certain inflammation and ulcerous pain happens to ſome Patients; but in ſome endued with a fervent blood, and whoſe Serum is leſs diluted, this enſues much fiercer. For the blood being brought thither by the Arteries, the ends of the Veſſels being cut off and obſtructed, it can neither go out nor be returned immediately by the veins, but ſticking there in the paſſage it is accumulated more and more, and being at length extravaſated, and filling and ſtopping all the Pores of the contiguous skin and fleſh, it raiſes a tumour with redneſs, and heat moſt intenſe, which coming to paſs, either the blood ſo heaped up, and extravaſated, in a ſhort ſpace of time becomes immovable by reaſon of conſtipation, and for that cauſe being as it were divided from the reſt of the maſs, it is extinguiſhed; and ſuffering death produces a Sphacela upon the part: Or ſecondly, the blood ſo ſtagnating, is after a ſort agitated as to its particles, and enjoying always a vital flame, and made more intenſe by the ſame, it is as it were boyled throughly, and ſo is changed into a Pus, to be evacuated by an abſceſs: Or thirdly, which happens more frequently, and ought always to be procured in our caſe, the blood provoking an inflammation is reduced into the Veſſels and reſtored to Circulation by other paſſages whereunto it is conſtrained.

Which happens to a new Iſſue, the reaſon of it and Cure propoſed.

An Inflammation hath three manner of criſis's.

But that it may be reduced, theſe two things will be neceſſarily requiſite: Firſt, That it be much diluted with the Serum flowing thither abundantly, or rather thruſt forward into the part: Then ſecondly, that the Veſſels behind the Tumour being emptyed, may ſwallow up the blood diluted, and driven back by the Serum; for the blood being forced towards the Tumour, when as it cannot advance forward, yet its bulk being diminiſhed; that it may be able to return back, it diſcharges the Serum plentifully from it ſelf, and drives it forwards into the places obſtructed; which entring under the ſtagnating blood, dilutes it, and ſucceeding into its places, forces it back into the paſſages of the Veſſels, and in the mean while that Serum tending forward exhales by the pores; inſomuch that the blood which was extravaſated being diluted and forced back by the Serum, and the Serum it ſelf evaporated, the ſwelling with the Inflammation vaniſhes leiſurely away. But if (as in more hot temperaments it comes often to paſs) the blood being extravaſated and impacted in the pores, be not diluted by the Serum brought to it in great plenty, it will not only ſtick there pertinaciouſly, but it will irritate a fiercer Phlogoſie with a Feaver, and ſometimes other dreadful ſymptomes. So, not long ago, when a renowned Divine, endowed with a thicker and hot blood, had an Iſſue cut in the inſide of his Leg, although the skin only was cut, an inflammation followed preſently, which within few days ſo cruelly encreaſed, that it could hardly be impeded by any Remedies from degenerating into a Gangrene. Wherefore, when the blood being extravaſated through the ſolution of the Union, and wanting the afflux of the Serum whereby it may be diluted and brought back, proceeds into an Inflammation, Fomentations and Cataplaſms of Emollients being outwardly adminiſtred, do often-times bring help; inaſmuch as the moiſt and ſoft particles falling from theſe, go under the blood ſtagnating, and dilute it, and ſo pleaſingly moving it together, cauſe it to return the more eaſily into the Veſſels; hence it is, that the moiſt applications of this kind being adminiſtred outwardly, do ſupply the defect of the intern Serum requiſite to dilute the blood; notwithſtanding that the blood being ſo diluted and irritated into motion, might be rendered fit for its Circulation, there is alſo need that the Veſſels which ſhould receive it ſhould be enough emptyed, for which purpoſe Phlebotomy and Purgation are frequently of neceſſary uſe, beſides a ſlender Diet. And indeed according to uſual cuſtom, we purge Cacochymicks or Plethoricks a little before, or after the Iſſue is made, and frequently breath a vein in thoſe Patients. Neither are theſe Remedies only fit

The ordinary and beſt of theſe is, that the extravaſated blood may be reduced.

How it is done.

What Remedies there is need of.

For this end oftentimes purging and bleeding are required.

in

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in an Iſſue made, to provide againſt or diſcharge an Inflammation, but alſo they are advantageous as often as that diſtemper enſues upon an old Orifice of the skin. For as often as the blood being very impure, and together growing feaveriſhly hot, doth enter into a ſeparating turgeſcence, it frequently happens that it diſcharges its recrements and feculencies, otherwiſe unapt to be purged out, about the Fontinel, and there being impeded in its Circuit by them accumulated together, it is extravaſated, and for that cauſe brings on a fierce Phlogoſis. Such an affection not long ſince happening in a renowned ancient perſon, and being neglected from its commencing, within a ſhort ſpace of time degenerated into a Gangrene; notwithſtanding from which by the help of appropriated remedies carefully exhibited, as well inward as outward, he eſcaped not without great danger of life. At ſome other time hereafter perhaps, when treating of Cutaneous diſeaſes, we will ſpeak more largely of the Ætiologies and Remedies of an Inflammation, and of an Abſceſſe or Impoſtumation and Spachela. At the preſent we will conſider the other Symptomes of Fontinels.

An Inflammation ſometimes happens to old Iſſues.

2. Whenever an Iſſue throws out too much Ichor, which for the moſt part is thin and very ſtinking, and ſometimes diſcoloured, ſo that the ſo vaſt loſs of humour, and that ſtinking, not to be endured, do require a Remedy; in ſuch a caſe there will be two chief Therapeutick Intentions, *viz.* Firſt, that the mixture of blood be ſtrengthened, leſt its conſiſtence ſhould be too prone to diſſolution and ſerous efflux: Secondly, That the tone of the place ulcerated by the Fontinel be preſerved, and rendred exempt from any putredinal ferment, ſo that no taint being there lodged in ſecret, do impart any pollution on the blood paſſing through in Circulation, whereby it being infected, might preſently go into parts, and the Serum be conſtrained there to diſcharge it ſelf more abundantly.

2. An Iſſue pouring out too much and ſtinking Ichor requires remedy.

Of which there are two Intentions.

This former ſcope of Curing enjoyns ſcarce any thing but moderate purging by intermiſſion, and a regular Courſe of Diet, *viz.* that the Patient be reſtrained from all ſurfeit and exceſs, as to the plenty of Nouriſhment, the quality, and ſeaſons of receiving it; likewiſe more eſpecially from ſmall Wines, Cider and other acid liquors, whereby the blood is wont to be diſſolved into effluxes. For indeed thoſe that are ſo affected, do ſmartly pay for any error or irregularity in Diet, pain being immediately irritated about the Iſſue.

Firſt, that the Temperament of the blood be reſtored.

For due preſervation of the tone of the place where the Iſſue is made, and exempting it from putrefaction, let ſedulous care be endeavoured, that all naſtineſs be declined, that both the ſolid things put into the orifice, as alſo the Coverings, whether Plaiſters or Leaves of Ivy, or Oyl cloaths, be changed twice every day; for in ſome perſons any of theſe will quickly contract a ſtench, and preſently cauſe the Ulcer of the Iſſue to putrifie. But if this tends to putrefaction, immediately in place of a Peaſe or wooden Pill, let a Pill of Virgins Wax be put in, incorporated with red Sanders and Verdigreaſe: Moreover, let a Fomentation withal, Morning and Evening, with the Decoction of St. *John*'s-Wort, Yarrow, Centaury, *&c.* be made uſe of.

Secondly, to preſerve the tone of the part ulceratid.

3. Sometimes a Fontinel like a dry Fountain pours out little or no humour; the reaſon whereof is uſually, either for that the orifice being not deep enough, doth not penetrate the whole skin, which is cured by piercing it deeper; or the Ulcer though hollow and large enough, yet remains always dry, becauſe the Serum doth not eaſily nor in plenty ſeparate from the maſs of blood, by reaſon of its conſiſtence being too much bound up; and then the only remedy is, to wear ſolid things within the Orifice, which may more provoke or twitch the mouths of the Veſſels, for which purpoſe Peaſe made of Ivy-wood, or Box, or of the roots of Gentian or Hermodactyls, are often uſed with ſucceſs.

Thirdly, a dry and troubleſome Iſſue requires help.

4. It often happens, that the Orifice of an Iſſue being too ſhallow, and ſparingly ſweating out Ichor, is grown over with a thin skin with the Peaſe included therein, and the deep hole is healed up quite; for which fault there is ſcarce an apt remedy to be adminiſtred. Wherefore it is better to cloſe that Iſſue (rather than always in vain to fret the skin) or transfer it to ſome other place.

An Iſſue ſometimes will heal up notwithſtanding all endeavours to the contrary.

5. The ſore of an Iſſue tending to healing, and being forbidden, often procures a ſpongious fleſh about the edges, and ſometimes in the hollowneſs it ſelf; the reaſon whereof is, becauſe the nutritious liquor being conveyed to the ends of the Arteries and nervous fibres, and being not immediately waſht away by the ſerous Ichor, fixes there, and beginning to be aſſimilated ſtretches out both theſe veſſels to fill the cavity with fleſh, and into theſe rudiments of fleſh both the blood and Animal ſpirits flow moſt copiouſly; and the blood in the mean time being conveyed thither, forms ſprigs of veins within that bulk for its return: Notwithſtanding this fleſh as yet rude and without ſhape, being excluded for the moſt part from the hole, grows up over the edge; and when in this manner it riſes higher than that it may poſſibly be

Sometimes it hath ſpongy fleſh growing about the lips.

covered

covered and cloathed with skin and Cuticula, it remains always naked and ſpongious. This excreſcency is eaſily enough cured by ſprinkling thereon Eſcharotick powders, of burnt Alum, Colcothar, or Mercury precipitate; for remedies of this kind do eat away the fleſh ſo luxuriating by their acrimony as well as ſtiptickneſs, repel the nutritious humour, and lock up the mouths of the Veſſels. As often as that ſuperfluous fleſh encreaſes about the ſides of the Iſſue, it is a ſign that the nutritious humour flows thither more plentifully than the excrementitious; and for that cauſe in Patients ſo affected that vent proves not always ſo benign. Wherefore, under pretext of this reaſon many are averſe to that remedy (though ſurely it is harmleſs to moſt, although not alike uſeful and advantageous to all.) We have before conſidered the chief diſadvantages thereof, as likewiſe the ſcandals objected thereunto; yet there remains another thing according to the opinion or rather error of the Vulgar, a notable objection againſt Iſſues, which we will here diſcuſs for a Concluſion.

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The reaſon thereof delivered.

With many in *England* a contumacious opinion is grown up (I know not whether it be ſo in other Countreys) That one or more Fontinels diſpoſe to barrenneſs. Wherefore this kind of remedy, however otherwiſe conducible to health, is ſcrupulouſly forbidden to all marryed Women that deſire Children; of which Prohibition there is no reaſon as yet made out, but only Stories related of certain Women that have been barren having Iſſues; when it were as eaſie to enumerate more barren women without Iſſues, and many others that have been fruitful with them: and truly I uſe to retort (whenas there is no need of any other refuting) this as a chief Argument againſt that opinion.

The common error is, that Iſſues diſpoſe to barrenneſs.

SECT. III. CHAP. V.

Of the Diſeaſes of the Skin, and of their Remedies.

AFter Attractive Remedies of the *Cuticula* and Skin, namely Iſſues and bliſtering Medicines delivered before, by a certain Law of Method we are induced to handle Diſeaſes of thoſe parts; and other kinds of Remedies of divers ſorts the true Ætiology of which will afford matter of moſt pleaſant as well as profitable ſpeculation.

As for the fabrick and uſes of thoſe parts, it needs not that I ſhould here repeat all things already accurately deſcribed, and well known in Books of Anatomy. It may ſuffice us to note concerning the *Cuticula*, that this outward skin is thin, and denſe, without blood and without ſenſe, as deſtitute of Veſſels and Fibres, which cleaving to the inward skin, covers and defends it from outward injuries. This is every where full of pores, into what orifices the Veſſels diſcharging ſweat do open, which *Malpighius* viewing more accurately with a Microſcope, a little before their gaping or opening, affirms to be endued with little Valves, for the retaining or free breathing forth of ſweat: but I confeſs they lye hid to me.

A Deſcription of the Cuticla.

The *Cuticula* being taken away by Fire, or Phænigmons, the skin appears naked, and looks red by reaſon of the ſanguiferous veſſels. But this is a thicker membrane, as to its greateſt parts, formed of filaments of Veſſels bringing blood, of Nerves, and of nervous Fibres, variouſly interwoven and complicated among themſelves, among which numerous Glandules and Lymphaducts, or Veſſels diſcharging Sweat and Vapours, are thickly interpoſed. The ſubſtance hereof is related to be double by moſt Anatomiſts, the outer is nervous, the inner fleſhy, or rather glandulous; for an example of which the Rind of an Orange is brought. If the skin be viewed naked by a Microſcope, by the renowned *Malpighius*'s obſervations, Firſt there preſents it ſelf a body in form of a Net, in whoſe thick holes are contained not only paſſages of Sweat, but alſo very many Teats in form of a Pyramid, riſing out of the skin in parallel ranks and paſſing into the *Cuticula*, where being ſtretcht out in length, they are divided as it were into many little Fibres; which the ſame Author hath determin'd to be the ſenſe of touching. Beſides theſe, the ſubſtance of the skin contains very many Glandules, by which means the Lympha or watery matter is carried by the Lymphaducts or excretory Veſſels, out of the Arteries to the Pores. For indeed the moſt accurate *Stenon* hath obſerved, *that its Glandules lye under every pore*; which become either greater or leſſer, according to the uſe of ſweating: the ſweat or vapours continually

Of the Skin.

The Pyramidal Papillæ the Organ of feeling.

The Pores and Glandules of the Skin.

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continually ſtreaming out of theſe by the excretory veſſels, avoiding the excrements, do moiſten the nervous Teats in their paſſages, leſt perchance they ſhould grow dry.

The Pores two-fold, greater and leſſer.

As to the pores or paſſages of Sweat they are diſcovered by a Microſcope to be of two kinds, *viz.*, The greater, in moſt of which the roots of the hairs are implanted, and by interſpaces on both ſides of each wrinkle of the skin, are diſpoſed in a parallel rank: Or, ſecondly, they are the leſſer Pores, which being numberleſs, do fill up all the ſpaces between the former in moſt thick Punctums or pricks. For indeed the whole skin with its wrinkles, appears like a Field furrowed by a Plow, and afterwards harrowed with the ranks turned, or rather oblique; ſo that its ground being eminent above the furrows of either kind, there remain in its plain, Figures very much of a Rhomboidal or a Diamond-faſhion; and accordingly as thoſe furrows, with their banks or flattes, are either ſhorter and leſs, or deeper and greater, the texture of the skin appears either delicate and thin, or thick and courſe. This kind of Conſtitution although it be moſt owing to ones birth, and to the primogenial growing together of the humours, is however manifoldly altered by reaſon of the various accidents of the enſuing life. A more groſs Diet, difficult labour, injury of Air, and chiefly exceſs either of heat or cold, render a skin more rough: alſo contrariwiſe a nice and delicate education renders its tone more fine and ſoft.

The wrinkles and furrows of the Skin.

From whence the Roughneſs or Fineneſs of the skin.

Depends much on the Humours filling the Pores.

That the skin may become more neat, ſmooth and equal, it avails much that all its pores be filled with a benign, mild and unctuous humour; for ſo, whileſt all its pores become full and extended, the level of the whole skin appears more ſmooth: Notwithſtanding if a vicious humour furniſh thoſe pores, or the benign humour that was in them be too much exhauſted, for that cauſe the skin will become rough and full of wrinkles. Wherefore if any endowed with a moſt ſoft and even skin, ſhall wet their hands in a Soap Lather, Lie, or Lime-water, or alſo for ſome time in warm Blood, preſently the furrows and wrinkles will grow greater and deeper, the ſaline humour being drawn out by the other Salts out of the pores; wherefore more delicate women ſcrupulouſly decline waſhing with Soap, or any other things that furrow the skin.

From the ſudden ſhutting up of the pores.

Neither only the humour being too much exhauſted out of the pores, but alſo retained in the ſame either unduely or above meaſure, doth render the skin rough and unequal. The hairy pores (which though they are not the only, yet are much the paſſages of Sweat) do conſtantly ſend out more plentiful Effluvia's for the ſake of tranſpiration, wherefore they ever ſeem greater and more open; but if it ſhall happen that theſe are ſuddenly obſtructed by any outward cold, the Vapours being reſtrained within, they do every where ſwell up the skin about the places where they break out, and lift it up into little heaps: from hence if at any time our bodies are expoſed naked to the Northern wind, or are plunged in a River, the exterior Superficies before ſmooth and ſoft, will become rough and rugged like the skin of a Gooſe new pull'd. Without doubt thoſe greater pores, being, according to the furrows of the skin, planted parrallel, and as it were in a rank after the manner of a *Quincunx* or exact Square, are made as ſo many pitts for the planting of hairs as it were trees; for ſo they appear in four-footed Beaſts, and in ſome hairy parts of men.

In the larger pores are the roots of the hairs.

Theſe things being thus briefly declared concerning the *Cuticula* and Skin, as touching their frame and uſes, there is way enough made to ſearch and unfold the Diſeaſes of the ſame parts, and the reaſons of healing them.

No Diſeaſes of the Scarf-skin.

Wherefore firſt ſcarce any Diſeaſes properly belong to the *Cuticula*, it being devoid of life and ſenſe. This ſometimes being too thick hinders Tranſpiration, and alſo ſometimes by reaſon of accidents in ſome places it grows too thick and callous: but it ſelf being clearly unſenſible it is never ſick, notwithſtanding this is a cauſe that ſome diſtempers which might be blown off by Tranſpiration, do cleave to the ſuperficies of the skin, inaſmuch as the dregs of the blood, and humours, and recrements being thruſt forward outwards, having paſſed through the whole skin, when they cannot evaporate wholly by reaſon of the thickneſs of the Scarf-skin, being faſtened in the outer skin, produce various diſcolourations, and ſtains thereof; of which ſort are thoſe ſpots called Heat-ſpots, Freckles, or Ephelides, as alſo ſcorbutical and malignant ſpots, alſo Pimples and whatſoever other ſtains without any ſwellings or roughneſs do ſeem to beſprinkle the skin or outward Scarf-skin, with marks, or ſome little diſfigurings.

The cauſe of ſome.

The Cutaneous diſtempers reckoned up.

But truly as to what belongs to the diſtempers of the Skin it ſelf in general, ſince they are various and manifold, they are wont to be diſtinguiſhed under a various reſpect, and chiefly that they are either with or without a Tumour; we have but now taken notice of theſe latter ones.

Diſtempers in the skin with or without a tumour.

Diſtempers of the Skin with a Tumour, are either univerſal, diſperſed throughout the whole body; or are particular, being raiſed in theſe or thoſe members, diſperſed or as it were by chance.

The

The former either happen upon a Feaver, as chiefly the Small-pox, Meaſles, or other malignant wheals, whereto alſo may be added the fleeting puſhes of Infants; or happening without a Feaver, as the Itch, Tetters, and leprous diſtempers.

The outward particular Tumours, or diſperſed ones, for the moſt part do not ſeize upon the skin only, but alſo upon the parts ſubjected, *viz.* now the carneous, another while the tendinous, or membranous or glanculous, and for that cauſe do exiſt of a ſundry diſpoſition, and of a diverſe form. To diſcourſe particularly concerning all theſe, and to aſſign the reaſons of their Cauſes, and Cure of every one, would be a matter not only of an entire Tract, but of a great Volume: Wherefore, for the preſent we will only briefly ſpeak of the Diſtempers merely or for the moſt part Cutaneous (of which ſort are all Spots and Pimples, as alſo the Scab, or Itch, Tetters, or leprous Maladies:) perhaps, an opportunity may happen, when I may treat more ſpecially of Tumours of every kind.

1. Spots call'd Ephelides.

Firſt then (that we may begin with Spots as Affections of leſſer moment) theſe offer themſelves called *Ephelides*, becauſe they are chiefly cauſed from the Suns heat; for that cauſe frequent in the Spring, and increaſe moſt in Summer, again in Winter they ſoon vaniſh. Moreover, whereas they happen in the more beautiful perſons, and of a thinner skin, they break out chiefly in thoſe places where the *Cuticula* is moſt thick, and is expoſed to the Sun and Air, *viz.* the face and hands, of a colour yellowiſh or brown, in magnitude of a Flea-bite, but they exiſt unequal and irregular as to their Figure. Theſe differ little or nothing from thoſe browniſh or yellowiſh ſpots which ſome call Lentigines or Freckles, which conſiſting of the bigneſs of a Lentil, mark the parts of the face as it were with many drops.

The deſcription of the Ephelides.

The matter and cauſe thereof.

The matter of theſe ſeems to be a more thin portion of the cholerick humour, allured outwards by the force of the Sun attenuating it, and opening the pores of the skin; which beginning to be evaporated, is fixt to the inſide of the outmoſt skin or *Cuticula*, which it cannot paſs through. Surely it is a ſign theſe ſpots proceed from Choler, or other yellow ſcums of the blood, becauſe they are chiefly familiar to them whoſe hair is yellow. Moreover, the reaſon is manifeſt enough, becauſe they ariſe more often in a fair Complexion, and in thoſe parts expoſed to the Sun and Air; for their more thin skin tranſmits the humour rarified by the ſolar heat ſo far until it is retained by the thicker Scarf-skin, near the places of iſſuing out. This affection preſages or indicates no evil, as to the ſtate of health; and although in appearance it repreſents ſomething of deformity, notwithſtanding that is made good again, inſomuch that it ſignifies them ſo ſpotted, to be endued with a more pure Conſtitution.

Lenticular Spots.

Beſides theſe ſmall freckly ſpots there are others much larger, above a hands breadth in magnitude, which deform the skin in divers places, eſpecially about the breaſt and back, one while with brown, another while with pale or blackiſh ſpots. Theſe at certain times, as I have obſerved in many, being wont to ariſe in certain parts and vaniſh again, are commonly called Liver-ſpots, and thoſe moſt markt with them are thought to have a Liver leſs ſound, or at leaſt not well ſanguifying; which notwithſtanding is not true on this account, but only inaſmuch as the cholerick humours, when they are not enough ſeparated from the maſs of blood within the Liver, being thruſt forward to the skin do ſo diſcolour it: which fault alſo is imputed to the Spleen; for truly this deformity ariſes, becauſe that the feculencies and excrements of the blood, when not enough received by the Veſſels of ſeparation, are together diluted with the Serum, with which they are conveyed to the skin, and in the ſame place being caſt off by the blood, and deſerted by the ſerous Juice while it is evaporating, they are faſtened about the outer little holes or pores, even as a moſſie down cleaving to the ſtrait places of a River.

Liver Spots falſly ſo called.

The deſcription and cauſe of them.

Theſe ſpots chiefly appear in Summer, and moſt upon the Breaſt and Back, *viz.* at which time and in thoſe places men are moſt apt to ſweat: for that ſerous Juice which brought out thoſe dregs from the maſs of blood, into the ſtrait places of the skin, leaves them there, altogether unable to evaporate. This indiſpoſition hath nothing of evil joyned to it, nor is it a ſymptom of any preſent diſeaſe, nor doth it preſage any ſuddenly approaching; Moreover, when for the moſt part it happens to places that are covered, and brings no deformity or trouble, there ſeems little or no need of Cure: but becauſe an opinion is frequent with the Vulgar, that the Liver is eminently endangered by theſe ſpots, and neceſſarily requires Medicine, for this cauſe to ſatisfie the importunate, craving Medicines, we are wont to preſcribe, beſides extern Coſmeticks, even inward hepatical Remedies; whoſe uſe although not very neceſſary, yet becauſe from thence the depuration of blood, and opening obſtructions of the bowels are diſpatcht, they are not altogether in vain. The inward Medicines profitable to this de-

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ſign, are deſcribed before among the hepatical Remedies: The Topical or outward are altogether the ſame in theſe as in any other kind of ſpots; ſome ſelect forms of which we will annex.

Peſtilential and ſcorbutick ſpots.

Concerning Peſtilential, as alſo Scorbutical ſpots, of which we have purpoſely in another place ſpoken, there is no need here to repeat the ſame; eſpecially becauſe for theſe another method is required, than for thoſe but now deſcribed; inaſmuch that in one kind of ſpots, Medicines for the moſt part outward are wont to be adminiſtred, without Splanchnic or Cordial medicines, but in the other kinds only inward medicines, without any that have reference to the Skin.

The Cure of the Spots.

Wherefore, as to the ſpots called Freckles, Lentigines, and thoſe commonly called Hepatical, they properly belong to the Art of Beautifying; and for the taking away theſe Deformities, of the Skin, only Coſmetick Remedies are preſcribed, without any method of healing. There is every where a plentiful harveſt of theſe with curious Ladies, and others, that are ſolicitous of cleanſing their skins; yet all theſe, foraſmuch as they only reſpect two Intentions of healing, may be reduced to theſe two heads; *viz.* either by opening the pores of the skin and Scarf-skin, and ſometimes by excoriating this, they do endeavour to have the humour drawn outward, and alſo to be evaporated; or on the other ſide, and not with leſs ſucceſs, thoſe things are adminiſtred that may drive back the ſpotty matter, and force it inward. We will annex here in order ſome uſual Forms of the Topicks of either ſort, being rationally found out, and frequently made uſe of happily enough; becauſe it is not lawful without offence of the Great Ones to detect the more ſecret myſteries of the Coſmetick Art, and to profane it among the Vulgar.

Forms of Coſmeticks.

1. Which cleanſe the skin.

Firſt therefore for cleanſing the skin, and drawing forth the matter of Spots:

Take of a ſmall ly of Salt of Tartar four ounces, Oyl of bitter Almonds made by expreſſion, as much as ſuffices, in ſuch a proportion let it be mingled, that the liquor turn preſently white, and ſo remain; with this mixture let the parts be anointed morning and evening, and gently chafed.

Take of Aron-roots, Bryony, Solomons-Seal, of each one ounce, Powder of Fenugreek-ſeeds one dram, of Camphir half a dram, theſe being beat together, pour on them three ounces of Oyl of Tartar per deliquium, *let it be preſſed and applyed with a rag twice aday.*

Take of quick Brimſtone in powder one ounce, black Soap two ounces, tye them in a rag, and hang them in a pint of Vinegar for nine dayes; after let it be uſed by waſhing the part twice aday, and chafing it.

2. Which repell the ſpotty matter.

Secondly, for the other intention of diſcuſſing the ſpots from the skin, and repelling their matter inwards, *Lac Virginis* was a renowned Remedy among the Ancients, and is as yet commended and made uſe of by many: The Preparations are well enough known, *Viz. A Solution of Litharge made in diſtilled Vinegar, by pouring of Oyl of Tartar* per deliquium, *it is precipitated into a white liquor like milk, with which let the face and hands be waſhed twice aday, and gently chaf'd. A remedy like this or of the ſame vertue is prepared out of the ſolution of red Lead or Ceruſe made in the ſame Menſtruum, and precipitated with Alum Water, or a Solution of Sal Gem. Or,*

Lac Virginis.

Take of Camphir ſliced two drams bruiſed in a glaſs Mortar, pour thereon leiſurely the juice of one Lemmon, then add one pint of White-wine, ſtrain it, and let the remaining Camphir tyed in a rag be hung in the Glaſs.

Take Verdigrieſe four Ounces, pour thereon two pints of White-wine Vinegar, being put into a Cucurbite-glaſs, let them be diſtilled in Sand, let the Phlegme be kept for uſe, with which let the face be anointed twice aday.

For this purpoſe alſo the Phlegm of Vitriol doth notably conduce. It ſuffices ſome to uſe the diſtilled ſimple water of Bean-flowers, or of Fumitory, or the liquor of a Vine diſtilling from the Boughs cut in the Spring-time. Notwithſtanding the more nice, and thoſe who chiefly boaſt to underſtand this Art, are ſcarce content with any Remedies but Mercurial, wherefore the following water is commended and ſold by Empiricks at a great rate againſt all foulneſs of the face whatſoever.

A Mercurial Coſmetick water.

Take of Mercury ſublimate one ounce powdered, put it in a Tin Veſſel with three pints of Spring-water, let them ſtand twenty four hours ſpace, ever and anon ſtirring it with a wooden Spatula until the whole liquor grows black, which notwithſtanding being philter'd through brown Paper, becomes clear; with a rag or a feather dipt in this, let the face be gently done over once or twice in aday.

This

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This Remedy doth moſt notably help againſt all cutaneous Deformities, *viz.* inaſmuch as it drives away the humours within the little pores, and thoſe impacted within the little holes howſoever ſmall, diſſolves the inveterate and ſtubborn combination of Salts or Sulphurs, and reſtores the whole skin, (where it is applyed) though evilly framed as to its pores, and makes it well coloured. Wherefore it is uſeful not only to cleanſe the ſpots of the face, but alſo to take away wheals and its redneſs, as alſo the Diſeaſe of the Eriſypelas. Moreover, ſometimes it happens that many parts of the face, eſpecially the Noſe and Forehead, are markt with moſt thick Specks looking black, as if burnt by Gun-powder, which proceeds from hence, becauſe the ſudatory pores are ſometimes fill'd with a more thick black humour, another while with little worms with black heads (which little Inſects being ſqueezed out of the pores, and expoſed to the Sun, are eaſily ſeen to live, and to move themſelves) and in ſuch a malady of the skin, no Lotion or Oyntments are wont to profit, but what are Mercurial; notwithſtanding to this Hony there is a Thorn at hand more than enough malignant. For the particles of the Mercury together with its Salts (by which they are divided and ſharpened into ſmall bits) being applyed to the face, do ſhake off the peccant and uncleanly matter out of the Pores, and expel it thence, but having driven it back, they purſue it in, and readily inſinuate with the Blood and nervous Liquor, whoſe temperaments they prejudice. Yea by meeting with theſe they imprint very often on the Brain and ſometimes on the Præcordia and other parts, their virulency that can never be wiped out. From hence it is frequently obſerved, that women or men that have long uſed Mercurial Coſmeticks, are troubled with a Vertigo, and convulſive Diſtempers, or are obnoxious to paralytical, and their Teeth grow black, and ſometimes fall out.

Its Vertue.

Its familiar uſe is not ſafe.

SECT. III. CHAP. VI.

Of the Mange or Scab with the Itch.

After the more ſimple maladies of the skin, *viz.* thoſe which happen without any Tumour and Ulceration, and only deform it with ſpotted appearances, we will now in order treat of the more grievous Affections, and thoſe which diſſolve the Unity, and eſpecially of the Pſora or Scab, which in ſundry and frequent places of the whole Body doth much infeſt the skin with a painful Itch, and with ſmall puſtles and breakings out, being ſometimes dry and often ſcaly, and another while moiſt and diſpoſed to ulceration; and a malady of this ſort is moſt properly the Diſeaſe of that part, conſidering it frequently begins in the very skin by reaſon of ſome outward Contagion, and often receives Cure by certain Remedies applyed to the skin only, at leaſt the reaſon of both holds ſo far, that it is ſeldom otherwiſe undertook or perfectly cured.

Pſora a diſeaſe properly cutaneous.

The Pſora or Scab is vulgarly deſcribed to be a breaking out of Puſtules and wheals throughout the whole body, here and there, procured from a ſharp and ſalt humour heaped up in the Pores of the skin, and that it may be diſcuſſed from thence induces a notable Itch, and a neceſſity of ſcratching.

Its deſcription.

That we may ſearch duly into the cauſes of this Diſeaſe, and the reaſon of the ſymptoms, we will more deeply enquire concerning the matter effecting and the conjunct cauſe thereof, that it may certainly be known of what ſort that humour is which is heaped up within the skin, by what means it is either generated there, or comes from ſome other parts, afterwards in what pores or little places it is contained, and how endeavouring to break out, it doth create ſo troubleſom an Itch.

Wherefore about the origine of this Diſeaſe, that we may not impute the fault with the Ancients to the Liver or Spleen, the matter thereof is not any particular humour of the four commonly ſuppoſed ones, not Phlegme, nor yellow Choler, nor black, neither only the blood apt of it ſelf to be extravaſated; moreover neither doth it ſeem to conſiſt of two or more of theſe humours mixt together. For though ſuch humours be granted, notwithſtanding if this Diſeaſe always conſiſts of them, it would not ſo eaſily be catch'd by a meer and light contagion, or receive Cure by an Oyntment alone. Wherefore it is rather to be ſuppoſed, that the morbific matter is the humour of the Lympha conſtantly reſting in the glandules of the skin; notwithſtanding

What humour its matter is of.

Not any of the four common humours.

But a humour plac'd in the Glandules of the skin.

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degenerating from its genuine diſpoſition, that is to ſay, its volatile ſalt, into an acid or otherwiſe offending diſpoſition. For when the continual Supplements from the blood come to this ſo depraved, and unceſſantly evaporating, theſe Juices new and old do not eaſily agree, or are united, but boyling together after the mutual cuſtom of diſſimilar Salts, they are coagulated into a recrementitious matter, which filling and diſtending the pores of the skin, every where raiſes it into Tumours; Moreover it ſomething hinders the Blood in its paſſage, and conſtrains it to be extravaſated. From hence thick Puſtules are raiſed, and becauſe that matter paſſing into an Ichor is compelled by the Serum and Blood purſuing it ſtill forward, they riſe up into little heaps; afterwards the Animal Spirits entring inordinately into the nervous Fibres, that they may promote the throwing off that Ichor, do cauſe the ſenſe of that troubleſome itch.

The deſcription of that Juice or Humour.

Indeed an inſpection with a Microſcope doth moſt clearly diſcover that there is a lymphous humour in the glandules of the skin which lye under all the ſweating pores, treaſured up for ſome uſes, ſo that according to the plenty and diverſe ſtay thereof, theſe Glandules exiſt more or leſs turgid. This Juice is laid aſide by the Blood, through the Arteries, in theſe Glandules, that this little burthen being caſt off, it might return more eaſily through the veins; in the mean time being repoſed there, it hath its uſes, *viz.* In the firſt place continually moiſtening the miliarie Teats, which lying under the nervous little Fibres, are the proper Senſory of Touching, it preſerves them from dryneſs, which would hinder the Senſe; alſo it imbues the aduſt effluvia's paſſing unceſſantly from the blood being kindled, in their paſſage near the skin, with a certain moiſture, and renders them fit to be voided by the pores; and whileſt part of this humour doth ſo continually evaporate with the Effluviums of the blood, thoſe expenſes are repaired by the Lympha continually freſh, being depoſited by the Arterial blood as is aboveſaid.

How it degenerates.

Notwithſtanding this œconomy of the Region of the skin is not always ſo regularly kept, but that the glandulous humour falling from its own diſpoſition and function, not only will provoke in the skin, but ſometimes in the whole body, preternatural affections of divers ſorts. This growing clammy, and cleaving more obſtinately in the little Cells obſtructs tranſpiration; and immoderate ſweating proceeds from its too plentifully flowing out, and from the ſame reſtagnating inwards, a more than uſual Diureſis. Moreover, as to what belongs to the Scab and puſtulous eruptions, that humour as it is wont to be depraved many ways, ſo chiefly theſe three, and is wont to enter into a coagulative diſpoſition with the Serum, being freſh poured out from the blood, *viz.* Firſt the Blood it ſelf being very impure, and alſo diſſolved, it leaves its corruptions and ſuperfluous droſs in the cutaneous Glandules, which in the ſame place putting on the nature of more corrupted ferment, they boyl up with other adventitious Juices, or paſſing by theſe, and are diverſly thickened, and ſo they beget not only puſtulous affections, but alſo leprous of divers kinds. From hence the daily and often eating of Shell-fiſh, and alſo of others; and of ſalted meats that have been hung in the Sun or Smoak; alſo the taking diſagreeing Drinks, and venemous Medicines, do cauſe cutaneous and frequently dreadful eruptions.

This is done three wayes.

1. By reaſon of impure Blood.

2. By mere ſtagnation.

Secondly, The humour being heaped within the cutaneous Glandules, ſometimes doth not only become puſtulous by a mere ſtagnation, but alſo frequently Louſie. Wherefore, not only they that have been long in priſon, but alſo thoſe who being of a ſedentary life, are uſed to naſtineſs and ſluttiſhneſs, do live obnoxious to the abovementioned maladies; inaſmuch as the cutaneous humour being not at all eventilated, is corrupted by mere ſtanding, after the manner of putrefying water, and ſo it puts on the diſpoſition of a corrupting ferment; to which moreover Supplements of putrefaction come from the blood in the like manner depraved.

3. By Contagion received from without.

Thirdly, If perhaps theſe Cauſes are wanting, that the glandulous humour of the skin, neither contracts any ſtain from fault of the blood, nor its own proper ſtagnation, notwithſtanding virulent ſteams communicated from without, render it no leſs prolific as to thoſe diſeaſes. This is manifeſt by common obſervation eſpecially, forasmuch as they that have health moſt, and are endowed with the beſt Conſtitutions, ſcarce ever eſcape free from the ſame, if they lye in the ſame Bed either with a ſcabby perſon, or where he hath lately lain: and not only ſo, but moreover the Linnen of the Scabby, oftentimes waſhed with other Linnen have beſtowed the contagion upon others. Surely, the taint of no diſeaſe (the Plague only excepted) is more eaſily or certainly propagated than this of the Mange.

The reaſon of its moſt ſudden contagion is unfolded.

If the reaſon of this be enquired into, we preſently ſay that the liquor ſuſceptive of the ſcabby taint is mightily expoſed, and moſt eaſily diſpoſed unto it; and indeed much more ready to either, than the Blood or Nervous Juice. For the glandulous humour

humour of the skin abounding in the outer ſuperficies of the body, firſt imbibes every Atome let in by holes and pores every where open, and anticipates them from the blood. Moreover, that this is ſo ſoon infected with a ſcabby Contagion, both the activity of the ferment communicated cauſes it, and alſo the proneneſs of the glandulous liquor to degenerate. For indeed the effluvia's falling from the breaking out of the ſcabby skin, are aptly enough compared to the Yeſt of Ale, remaining on the top as it were its outmoſt Coat; of which if the leaſt portion be taken from thence, and mixed with other new Ale unfermented, preſently it ferments the whole maſs how great ſoever, and changes it into the diſpoſition of the liquor from whence it was taken. Certainly there is a very conſiderable energy, which the particles however ſo ſmall and little, carryed to the higheſt activity, are able to perform; but eſpecially if they fall into a liquor (of which ſort is the cutaneous) made up together of ſubtile particles of the ſeveral ſorts, as well partaking of the blood, as of the nervous Juice, and for that cauſe moſt readily apt to be fermented. Whereſoever therefore theſe effluvia's of the Contagion aboveſaid hit againſt any outward part of a healthful body, firſt they will infect the cutaneous humour only planted in that place, but then the particles of this ſo corrupted, being received by the venous blood, and preſently delivered to the Arteries, are diffuſed through the entire habit of the body, and in a ſhort time defile the whole maſs of this Humour and make it ſcabby.

The Contagion when any where received, preſently ſpreads over the whole skin.

From theſe Cauſes of a Pſora as well adjunct as procuring being unfolded, the reaſon of the firſt ſymptoms, or breaking out in Puſtules, is manifeſt enough; but as to the other, *viz.* the Itch, as it is troubleſome to Senſe, that the formal reaſon thereof may be known, we ought to conſider to what Senſory or Organ of ſenſe it properly belongs, and of what ſort its paſſion or affection ſhould be.

Of the Itch.

Concerning theſe things, firſt it is ſure it belongs to the ſenſe of touching, and that the firſt Inſtruments hereof are Teats faſhioned like a Millet, and their little Fibres diſperſed through the whole skin, as we have before declared. Moreover with this ſenſe all the nervous fibres are endowed, being diffuſed throughout the whole body. Notwithſtanding, whereas there are two ſupream paſſions of Touching, and as it were generical, *viz. Pain* and *Pleaſure*, it is deſervedly doubted to which of theſe Itching ought to be related. For the ſolution of which, we ought to ſhew by what means the Animal Spirits, being inmates to the organ of Touch, are affected in Pain, and alſo after what manner in Pleaſure; then their demeanour alſo as to the Itching being deſign'd, it will eaſily be manifeſt of what Province this Paſſion is, and in what things the nature of it, and the manner of its acting do conſiſt. Let the Reader pardon me, if I ſhould by way of digreſſion expound this more at large, and even to tedioufneſs, becauſe this Ætiology ſeems very neceſſary both to the underſtanding and curing of moſt outward diſtempers. Pain being diſtinct from Sadneſs and belonging to the Touch, is uſed to be defined, *A troubleſome feeling proceeding from the diſſolution of Unity.* And indeed it takes its origine as often, and in as much as any ſenſible thing, diſagreeable or improportionate, being applyed to that Organ of ſenſe, divides and ſeparates the fibres one from the other; and for that cauſe repelling the animal ſpirits inhabiting in them, from their wonted and quiet emanation diſtracts them from one another, and as it were puts them to flight; then preſently foraſmuch as that outward repulſe of the ſpirits, is communicated by a continued order of other ſpirits, to the firſt Organ of Senſe, it ſtirrs up the Spirits dwelling there into the like confuſions, ſo a perception is cauſed of grief or pain inflicted outwardly. In truth the whole ſeries of animal ſpirits which are affected with pain, as it were ſome ſingular member of the ſenſitive Soul, conceiving trouble, as it were from the impreſſion of the object, is forced to be wrinkled with pain, and to contract it ſelf into a leſſer dimenſion.

It belongs to the Senſe of Feeling.

Of what ſort its Affection is.

The chief Affections of feeling are Pain and Pleaſure.

The formal reaſon of Pain.

When a diſſolution of Unity is ſaid to be the cauſe of pain, we muſt not underſtand it ſo as if this affection only were cauſed from a wound or blow inflicted upon the body, for the ſame thing is uſed to be induced from cold, heat, wind, from the extravaſating of the blood and of other humours, or their being heaped up together in ſeveral places, oftentimes the faſhioning of the member remaining as yet intire; in which caſes, although the continued parts, and chiefly the fibres and filaments, are not at all cut off, notwithſtanding they are in every Affection of grief pulled from their uſual poſition, either by the oppreſſion of the object, or by ſtrange particles forced like wedges, and are compelled into too much tenſion or diſtorſion, or divulſion; and for that cauſe the inmate ſpirits being pulled from their mutual embraces, and diſſipated, are ill at eaſe, and incur the paſſion of pain or grief.

The Solution of the Unity always the cauſe of it.

Pleaſure

PHAR. Part. II.

Pleasure is opposed to Pain, and is a manner of Feeling clearly contrary thereunto; which takes its origine, inasmuch as a pleasant stroaking being made upon the Organ of Sense, the Spirits flock thither, and presently being thickly gathered together, and overspread with a certain delight, they do as it were exult and rejoyce together in the Organ: afterwards, inasmuch as the spirits enter into the like triumph or rejoycing within the *Corpus striatum*, a perception of pleasure is stirred up.

What Pleasure is.

Its formal Reason.

The greatest pleasure which is offered to the Touch, consists in this, that the cause of Pain being removed, the parts formerly affected by it, may recover their wonted temper and frame; for so the animal spirits being before put to flight, and dispersed from one another, they recollect themselves, and rushing into the places from which they were banished with reinforced strength, they prepare themselves to rejoyce. From hence the Peripateticks placed the formal reason of Pleasure only in the removal of something that was troublesome, as when the excess of cold or heat is received by an opposite and more agreeable state. Indeed the tangible object (because it is alwayes thick and dull) doth scarce any way else (excepting Venery) allure the animal spirits into heaps to the Organ of Sense, unless for that it removes their former confusion.

It chiefly consists in removing of Pain.

What the Itch is.

From these things so described concerning those passions, it is easily manifest, that the Itch according to the formal account thereof, is neither perfectly nor fully either Pain or Pleasure, but imperfectly and as beginning, partakes of both. For really the scabby matter being heaped up within the pores of the skin, and making the solution of Unity in many places, enclines towards pain: yet as it is volatile, moving, and hastens towards vent, for that cause the Animal spirits are not put to flight from the Fibres although pulled asunder, neither are they driven back with sense of pain; but the contrary, as if being stronger than the humour infesting, they were able to cast it forth, they being wrapp'd up more thick, but irregularly within the cutaneous fibres, do twitch them together variously, and draw them on, that they may the sooner discharge the morbific matter, and expell it forth. Wherefore inasmuch as the Animal Spirits being neither put to flight, nor repulsed, but flowing together in crouds into the organs of Touching, they manage themselves there tumultuously, and disorderly, and as it were by tickling the sensible fibres do provoke them into small Convulsions, no pleasure, but a troublesome feeling, nor also is it Pain, but a Passion clearly diverse arises from it. But as soon as by rubbing or scratching, the plenty of Spirits assembled about the Organ of Sense, begin to be better disposed, and as it were reduced into order, from thence a thorough feeling of Pleasure is introduced. Wherefore the Itching seems to be a middle-state between the beginning of Pain and Pleasure, or a passage of the Spirits from the rudiments of that, towards the full compleating of this. But from this Physical discourse by the by, let us return to our Pathologie or discourse of the distemper. From what is above said it is easie to collect the differences of this disease.

How the Spirits are moved in it.

A certain medium between Pain and Pleasure.

The difference of the Psora as to its origine.

In the first place therefore the Psora as to its origine either is got by Contagion, or by reason of an ill Course of Diet, the fierceness and supply thereof is communicated by the Chyle and Blood being vitiated, or it is generated in the skin it self, by reason of filth, and the defect of Transpiration: Whereto we may add, that sometimes Infants acquire this taint hereditarily contracted from their Parents.

2. As to its form.

Secondly, These cutaneous Eruptions as to their form, vary according to the diverse Constitutions of the persons affected: for in some persons of a cholerick dryer Temperament, or Melancholy, only a dry Scab is stirred up, and inasmuch as it evaporates less by reason of the defect of the Serum, with an Itching not altogether so troublesome; but in others of a moister Temperament, and of more unclean blood, very many wheals and pustules imbued with Ichor, and most of all itching, do very much provoke to scratching, and by reason of the Ulcers stirred up therewith, the Itch is immediately altered into pain.

The Prognosticks of it.

As to the Prognosticks, although this Disease is never of it self mortal or very dangerous, and always easie of Cure; yet frequently it contains an evil event; inasmuch as being long continued, it utterly depraves the blood and nervous Juice, and from it hastily cured, by reason of the matter received within, while it is discuss'd from the Pores, a pernicious taint is brought upon the Præcordia, and Brain, and other noble parts.

Most dangerous to Children and ill juiced or chachectick persons.

The greatest hazard from a Scab, threatens Children and Cachectick persons; as in both of which the taint is more easily impressed from this Cutaneous humour upon the nobler parts, which afterwards when the outward malady is removed, remaining within cannot be vanquished entirely, but a very long Course of Physick, of which neither is capable nor patient; wherefore, such persons, all care and diligence being

being administred, ought to be preserved from the infection of the Scab as from the Plague.

Concerning the Cure of a Scab or Psora, two chief Indications present themselves and each of them two-fold, *viz.* The first intention Curatory respects these two things, First, that the glandulous Humour (its corruptive ferment being wholly extinct) may be reduced to a due temper. Secondly, afterwards that the pores and passages of the skin being freed from those Ichorous congealings, may recover their pristine frame or good temper. *Its Cure. The first Indication curatory.*

The Second Indication Preservatory takes care to prevent those two things, *viz.* First, lest the impurity of the Psora, or corrupting Miasma's of the skin being discuss'd from the skin (while the ferment is expugned) turn back again into the blood and nervous liquor, and bring upon them not only ill temperaments, but also (as frequently it uses to do) a more considerable prejudice upon the Brain or Præcordia. Secondly, also let it be endeavoured that the taint of the Humours, and of the noble parts contracted from the Itchy matter, may be eradicated while the faults of the skin are repaired. *The second Indication preservatory.*

All these intentions of Curing, by remedies internal as well as external together being much and often used, ought to be joyn'd together, or at least-wise to be interus'd, *viz.* that the morbific matter being discussed from its recesses, may not depart into and lye hid in any lurking-places any where else, but from every part, inwardly and outwardly, by remedies taken, may be wholly removed away; wherefore Purgatories ought alwayes to begin and end this method of Curing. Although *Helmont* with great pomp overthrows this Cathartick method of Physick, and as it were leads it in Triumph, because it doth not cure the Scab by it self, yet we may affirm this Disease without that remedy can scarce ever easily be cured, but never safely. Moreover Phlebotomy, unless something contradict it, is presently to be celebrated in the beginning; upon these, Alteratives that cleanse the blood and strengthen the bowels, and defend against the assaults of the morbific matter, challenge their turns; and in the mean time Liniments, or Baths, or topical remedies of another kind, and properly Cutaneous, are administred: As without which not only Purging and Bleeding, but also Diaphoreticks, Diureticks, yea whatsoever remedies evacuating blood or humours, or altering them, become useless. We will annex some more select short forms of Medicaments, of every one of these Kinds but now recited. And first for the due undertaking of the Purging part, let there be administred in the beginning a purging Medicine or a Vomit; also after Phlebotomy being used (if need require) an Apozeme or purging Ale may be administred for seven or eight dayes. *Both inward and outward Medicines are to be taken together.* *Purges, Bleeding and Alteratives, and afterwards Topicks are required.*

Take of Electuary Diacarthamus three drams, Spec. Diaturbith with Rhubarb one dram, Cream of Tartar, Salt of Wormwood an. half a scruple, syrup of purging Apples what suffices, make a Bolus to be taken with Government. Or, *Forms of Purgers.*

Take Sulphur of Antimony seven grains, Scammony sulphurated eight grains, Cream of Tartar half a scruple, make a powder.

Take roots of Polypody of the Oak, sharp pointed Docks prepared, an. one ounce, leaves of Senna ten drams, Turbith, Agarick, Epithymum, an. one ounce, Carthamus-seeds half an ounce, Citrine Sanders two drams, Annise, Carue-seeds, of each two drams, being sliced, bruised, &c. digest them warm in four pound of White-wine twenty four hours, pour it clear off without straining: the Dose six ounces by it self, or with a spoonful of syrup of Epithymum.

Or take the foresaid Ingredients and boyl them in six pound of Spring-water to half, then add one pound of White-wine, and presently strain it for an Apozeme to be taken as the former. *Apozems.*

Take roots of Polypody of the Oak, sharp-pointed Docks an. three ounces, Senna four ounces, Epithymum, Turbith, Mechoacan, of each two ounces, of yellow Sanders one ounce, Coriander-seeds six drams, prepare them according to art, make a bag for four gallons of Ale; draw it after five or six dayes, take twelve ounces more or less every morning, for eight or ten dayes. *Medicated Ale.*

For ordinary Drink let a little four-gallon Vessel be filled with small Ale, wherein may be put the following Bag.

Take the tops of Tamaris, dryed Fumitory an. four handfuls, roots of sharp-pointed Docks dryed six ounces, the rind of woody Night-shade two ounces, slice and bruise them and mingle them. Or let them take a Bochet of the Decoction of Sarsaperilla, Saunders, with shavings of Ivory, Harts-horn, and Liquorish.

PHAR. Part. II.

Altering Remedies.

II. As to what belongs to altering Remedies, beside the Physick Ale for ordinary Drink, there seems not need of many others, but only, that a due government of Diet be observed, by declining Salt and spiced Food, Shell-fish, and others seasoned with pickle; also abstinence from Wine, Strong-waters, stronger Ale, and from all Liquors apt too much to stir and ferment the blood. In a contumacious Psora, and seizing upon a Cachectick body, it will be expedient to administer the following Electuary with a distilled water twice aday.

Electuary.

Take of Conserve of Fumitory, roots of sharp-pointed Docks, of each three ounces, Troches of Rhubarb, Species of Diatrion Santalon, of each one dram and a half, Salt of Wormwood one dram, Vitriolum Martis four scruples, with a sufficient quantity of syrup of Cichory with Rhubarb, make an Electuary, the dose from one dram to two, twice in a day, drinking upon it three ounces of the following water.

A distilled water.

Take of the tops of Fir-tree, six handfuls, of leaves of Fumitory, Agrimony, Fluellin, Liverwort, Brooklime, of each four handfuls, roots of sharp-pointed Docks two pound, Bark of Elder two handfuls, the outward Rinds of six Oranges, cut them and bruise them, and then pour upon them eight pints of Posset-drink turn'd with middle-beer, distill them in a Rose-Still; let the whole Liquor be mingled together.

Oyntments whereof the Basis is chiefly Sulphur.

III. Oyntments for to anoint the Skin, are wont commonly and efficaciously to be prescribed for the curing of the Scab; notwithstanding those which are administred to many other Tumours or Ulcers, do not help here at all; but Brimstone and Preparations thereof seem to have a specific vertue in this Disease, so that for the most part they are put into all Liniments for the Itch, and are the basis of the whole Composition. The Receipt chiefly used by the Vulgar is this.

Forms of them.

Take Powder or flower of Brimstone half an ounce, unsalted Butter four ounces, powder of Ginger half a dram, make an Oyntment.

A little more neat, though not much more efficacious is prescribed thus.

Take Oyntment of Roses four ounces, powder of Quick Brimstone half an ounce, Oyl of Tartar per deliquium *what suffices, make an Oyntment: for scent sake add one scruple of Oyl of Rhodium.*

Other stronger Medicines.

When the force of the Brimstone is to be drawn forth or strengthened by other things added,

Take Oyntment of Enula-campane without Mercury four ounces, powder of Sulphur half an ounce, Oyl of Tartar per deliquium *what suffices. For the same purpose the Oyntment of the roots of sharp pointed Docks boyled in Butter, or Oyl, with White-wine, to the consumption of the Wine, and made up with Sulphur and Oyl of Tartar.* Also those Oyntments are used with success by themselves, the more curious abhorring the smell of Sulphur.

The most powerfull made of Mercury.

3. The third kind of Liniment against the Itch, is made of Mercury, wanting no guards of Sulphur, or any other Vegetables. But of it self it is too powerful to be applyed all over the body, but only to the Joynts of the Arms and Thighs, or worn about the Loyns, made up in a Girdle, for so it seldom fails in curing the Itch. Notwithstanding there is danger left this practice (as it often happens) produce evil and pernicious symptomes; for from the Mercurial Oyntment, frequently a salivation, also sometimes dimness of the eyes, or drowsie or convulsive Affections do proceed: Also sometimes the Poyson of the medicine within the Præcordia or Bowels produces the dreadful Affections of short breathing, Swounding, or bloody Fluxes.

But dangerous.

The form of it.

The vulgar form of a Mercurial Oyntment, and chiefly in use for the Itch, is this.

Take of Quick-silver reduced into small particles with an acid, or (as they say) kill'd, an ounce and a half, fresh Hogs Lard six ounces, incorporate them well, stirring them long in a Stone or Glass-mortar.

A Mercurial Water for the Itch.

Neither only under the form of an Oyntment, but also after many other wayes the aforesaid Medicines are wont to be often used. For the fume of Cinabar (which is prepared of Mercury with Sulphur) cast upon Coals and taken in at the mouth, or striking the superficies of the Body, cures the Psora. The Mercurial Cosmetick before described

ſcribed being weaker by two degrees, if it be applyed upon the Skin, chiefly on the ulcerated places, it kills the Scab. Notwithſtanding the uſe of theſe is not always ſo ſecure as to be adminiſtred every where to all perſons.

Baths. Baths are prepared of Sulphur and Vegetables, either apart or together, being boyled in water which heal this Diſeaſe not as a common Bath, by only waſhing off the filthineſs of the Skin, but alſo by deſtroying the ferment thereof. Moreover, beſide theſe there is another more eaſie and neater manner of healing the Itch, *viz.* Let a Shirt boyled with Powder of Brimſtone in Spring-water, and dryed by the Sun or Fire, be worn next the body for four or five dayes; for ſo that diſeaſe is wont to be cured without bathing, or naſtineſs of anointing, or evil ſmell. *A Sulphureous Shirt.*

Why Sulphur is the Antidote of The Pſora. If the Ætiologie of theſe be enquired into, and firſt why Brimſtone is ſuch a ſpecifick Antidote againſt the Itch, that poor and ordinary men (who have not wherewithal to uſe any other Medicine) do take againſt this Diſtemper inwardly only powder of Brimſtone with Milk, and adminiſter it outwardly with Butter, I have already in part given an account, where we have unfolded the balſamick vertue of Brimſtone towards the Lungs. Namely, it is a good expedient in either caſe, inaſmuch as it deſtroys the acidities of the Blood and Humours, and all the exotick and corrupting roughneſſes, and reſtores a benign diſpoſition to every Juice, *viz.* a mild and unctuous: and ſo the Particles of Brimſtone any way outwardly applyed, do eaſily enter into the pores of the skin, and being admitted inward, do forthwith work upon the ulcerous Ichor there abounding, kill the Salts there predominating, and procure a Balſamick nature to the cutaneous Juice, that it may afterwards agree with the Blood and Serum continually flowing to it. *The Reaſon of it.*

How Mercury cures this Diſeaſe. As to Mercury, it is no wonder if Medicines prepared heroof do throughly heal the places of the skin affected with the Pſora wherever applyed, for by the application hereof, wheals and puſhes, and all malignant ulcers, *viz.* Venereal and Scorbutick, are wont to be tamed. Neither is it a thing to be admired, that theſe Remedies adminiſtred in any private places, as long as they provoke ſalivation, are a Cure of an Univerſal Itch; but really that without ſpitting they can produce ſuch an effect, as that a Girdle wherein Quick-ſilver is ſowed and worn about the Loyns, ſhould aboliſh the Scab of the whole body, and that ſometimes without any ſenſible evacuation or harm cauſed thereby, I ſay the reaſon hereof is not ſo eaſily apparent.

The reaſon of its vertue. Yet for the ſolution hereof, we muſt ſay that the Particles of Mercury being able to extinguiſh the ſcabbineſs of every Itchy ferment, when they are applyed to any private part, do preſently take away the Scab of that place; and beſides being caught by the venous blood, and diffuſed through the whole maſs thereof, and a little after they are not only carried back by the Arterious blood to the ſame place where taken in, but being brought outward every where, they are depoſited in the Skin of the whole body, and in the ſame place deſtroy every Miaſma of the Scab: If it then ſhall happen that theſe Mercurial particles, after they have finiſhed the Cure, ſhould be all evaporated again out of the Skin, no ſalivation afterwards, or other prejudice will follow.

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Of the Impetigo, *or* Lepra *of the* Greeks.

Several names of the Impetigo. After the Scab with the Itch, it follows that we treat of another Diſtemper, a little a-kin to this by reaſon of the breakings out of little puſtules, which is commonly call'd *Impetigo*, by ſome a Tetter and Morphew, and by others the Leproſie of the *Greeks*. And as it gains ſeveral names, ſo they are variouſly applyed by Authors, and by theſe they deſign one kind of Diſeaſe, and by thoſe another kind. Wherefore, as the names of this Diſtemper are variouſly confounded, and perhaps that as to its nature and formal appearance it has been various in divers Regions, neither may it be altogether the ſame in our generation as in former times, for this cauſe my buſineſs here ſhall not be to deſcribe this diſeaſe according to Books, but from the proper obſervation of the Patients themſelves.

It is deſcribed according to its appearances. The Impetigo is wont to ariſe and affect after this manner; to wit, little wheals or red puſtules, ſometimes ſingle, and ſometimes many together, are raiſed in divers

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parts of the body, but chiefly in the Arms or Thighs; to each of which, new ones every where are adjoyned, (the Diſeaſe augmenting) and in a ſhort ſpace of time there become many heaps of riſings of that kind, like cluſters. For the little pimples breaking out daily near to their ſtemme, and ſpreading ſtill larger, diffuſe themſelves into a Circle, and ſo cauſe every heap of Eruptions to be enlarged. The rough ſuperficies of each appears ſomething white and ſcaly, ſo that upon ſcratching the ſcales fall off, and often a thin Ichor ſweats out, which being preſently dryed up again, hardens into a ſhelly ſcale.

Theſe Cluſters of little Pimples being firſt ſmall and fewer, appear perhaps three or four in the Arm or Thigh, or other particular member, about the bigneſs of a Penny or half a dram: but afterwards, if the diſeaſe be ſuffered to augment, they break out every where more frequent, which being leiſurely encreaſed in their ground, afterwards appear to equal or exceed the bigneſs of a Silver Crown, but not always round or of a regular Figure, but diverſly formed. Moreover there is no ſtop in this condition, but the diſtemper, unleſs it be reſtrained with Medicine, breaking out ſtill in more places, and creeping on every where in broadneſs, at length not only covers over the whole member but alſo the whole body with a leprous dry ſcurf; and this kind of Impetigo the Ancients call'd by reaſon of its outrage Ἄγριον, and for the moſt part accounted it incurable.

The differences of this diſeaſe.

From hence the chief differences of this diſeaſe are made known; and in the firſt place as it is leſs or more malignant according to the faſhion thereof, it is diſtinguiſhed, as it comes nearer the nature of the Scab, or Leproſie, or as it is in a middle condition between both. We are alſo to note, this diſtemper ſometimes infeſts ſome particular members, as the Arms or Thighs, the reſt of the body being untoucht,; but ſometimes it begins together in all parts, and every where excites ſcatteringly little Pimples or Cluſters thereof. Alſo eruptions of this kind are in ſome for a ſeaſon, or periodical, and for the moſt part infeſt thoſe perſons during Winter only, vaniſhing away about Summer; likewiſe on the contrary, in others they abhorre Winter, and are wont to obſerve the ſeaſon of the Swallow going and coming, but in moſt others the Diſeaſe being continual grants no truce, yea it hath neither remiſſion nor mediocrity.

How it differs from the Pſora and Leproſie.

Moreover we muſt diſtinguiſh an Impetigo from other Diſeaſes a kin to it, and firſt from the Scab, and the Leproſie. It deffers from the former as to the form of the Puſtules; for every where in the Pſora they are ſingle and remote from one another, although by ſmall ſpaces; here moſt of them break out in Cluſters, concurrently, and as it were disjoyned by branches with great interſpaces. But between theſe diſtempers a notable difference yet ariſes, in that the Scab is wont eaſily or ſcarce otherwiſe to be propagated or ariſe, but by Contagion; but the infection of an Impetigo is ſo ſeldom or never, that the Miaſma from the Husband doth not paſs to the wife, or from her to him, though they lye together.

Alſo this Diſeaſe differs from the Leproſie, as well in reſpect of the form of its eruption, as of its contagion, which is likewiſe active in this, as in the Pſora; and the breaking out is much larger and more horrid, *viz.* it is every where ſhelly and ſcaly, without intermiſſion, and diffuſed through the whole body.

The material cauſe not a humour of the skin.

But tartarous Concretions begot in the blood.

From hence it is manifeſt, that the material cauſe of an Impetigo, is not merely a cutaneous humour, by reaſon of effluvia's or a taint received from without, or depraved by reaſon of other accidents, and degenerated from its temperament; becauſe it is not eaſily communicated to others by Contagion, as in the Pſora, neither is it immediately diſperſed throughout the whole body. But indeed little Puſtules breaking out firſt about the initiations of the Diſeaſe ſeem therefore to proceed, for that certain acid ſalt Concretions happen to be in the maſs of Blood (like Tartar in Wine) which when they can neither be concocted or again diſſolved, are here thruſt out into the skin, as there into the ſides of the Veſſel. As long as theſe Concretions are ſmall and few, they are conveyed into the skin in this or that member, and by one or two branches of an Artery; then as Nature is wont to continue the ſame manner of excretion as it began, the matter being carryed every where by the ſame veſſels, to the ſame neſts, near the firſt wheals it cauſes heaps of others round about them; but afterwards when the dyſcraſie of the blood is daily augmented, and that Tartarous matter is generated more plentifully in the maſs thereof, more portions are conveyed by other Arteries, and ſtill by more to the outward places: and for that cauſe alſo more pimples break out both in the ſame, and other members, which a new matter coming continually by the ſame Arteries, and being placed cloſe to the former, enlarges them every day, and every where dilates them by the addition of other puſtules; and at length if this ſort of Tartar of the blood augment hugely, being carryed

carryed out by more or all the Arteries together, it is faſtened in the skin, and in proceſs of time covers over all the ſuperficies thereof with a ſcaly or downright leprous ſhell: And then that cutaneous humour being wholly corrupted, promotes the diſeaſe it ſelf; for it cauſes the ſtock of the morbific matter to be encreaſed, by polluting more, or rather poyſoning the blood and humours, whileſt they paſs in Circulation; moreover diſmiſſing the corruptive ſteams from it ſelf, it renders the Contagion of the ſame diſeaſe unto others. PHAR. Part. II.

Wherefore, both the procuring and conjunct cauſes of this Diſeaſe conſiſt in this, for that without any fault of the skin, it happens that the blood is filled with ſalt Particles of a various diſpoſition and condition; (into the preceding cauſe of which diſpoſition we will anon inquire) and where thoſe fixt and acid Salts are eſpecially predominant (as the manner is) they mutually embrace one another, and ſo grow together into Tartarous Concretions; which being thruſt forth into the blood, cauſe eruptions of wheals, as it were neſts of the Diſeaſe; then they being daily and leiſurely encreaſed both in number and largeneſs, according to the ſupply of matter, they produce the beginning, augmentation, and ſtate of this diſeaſe. *The next cauſe of it.*

As to what relates to the antecedent and evident cauſes, there are two chief kinds of occaſions from which this diſtemper for the moſt part derives its origine; to wit, an evil manner of Diet, or a taint of the Scurvy, or Pox, or other Diſeaſes left in the body, being ill, or not at all cured. We will weigh a little the reaſons of each of theſe. *The evident cauſes.*

As to the former, beſides the common irregularities in Diet, wherein ſome being too much addicted to eating of fleſh ſalted and afterwards dryed in the Sun or Smoak, and the drinking of acid Wines, do eaſily contract this malady; Alſo it is a vulgar obſervation, that very many are diſpoſed thereunto by the too frequent or daily feeding on Pork, and Fiſh, and eſpecially Shell-fiſh. There is a notable inſtance of the former, which is, that the food was chiefly forbidden the *Jews* for prevention of this diſeaſe. Alſo there is an example of the other, that in time paſt the Inhabitants of *Cornwal* for the moſt part dwelling on the Sea-coſt, inaſmuch as the poorer ſort were fed with Fiſh, became very obnoxious to Leprous Diſtempers; inſomuch that for their relief many Hoſpitals were erected in that country. That I may hint in a few words the reaſon hereof, I am apt to think whether that food is rancid, or otherwiſe improportionate, that it conveys particles not rightly mixed, not eaſily to be ſubdued to our blood, which being ſo heterogeneous and largely heapt up by a long uſe of ſuch Diet, the ſaline particles of which kind do eaſily aſſociate themſelves, and ſo do conſtitute Tartarous Coagulations to be exterminated in the skin, and the ſeeds of the Leproſie or of the Impetiginous Evil. *Irregularities in Diet.* *The daily eating of Pork or Fiſh.* *The reaſon thereof inquired into.*

But yet a plentiful Crop is begot from the taint of the Scurvy and pox left in the body, and afterwards by the combination of Salts and Sulphur exalted to extremity. We have elſewhere diſcovered the reaſons of the former diſeaſe, and eſpecially of the foreſaid ſymptome coming after it, which being accomodated to our preſent Hypotheſis do make it more clear. And it ſo often happens, that puſtulous eruptions of this ſort do follow an inveterate Pox, although it ſeem to be cured, that none diſtempered almoſt with theſe, wants the ſuſpicion of that ſhameful Diſeaſe; ſo that the firſt Queſtion of a Phyſician in ſuch a caſe being conſulted, is, Whether the Patient, have not at ſome time formerly contracted that Diſtemper? For ſurely the Corruptions of the blood, after they are by a long ſtay become altogether heterogeneous and indomitable, at length acquire to *themſelves ſalt Particles, wherewith growing into ſuch like Tartarous Concretes, and being thruſt forth into the skin, produce thoſe Impetiginous Puſtles. *It often follows the Pox and Scurvy.*

As to the Prognoſtick part of this Diſeaſe, although it ſeldom threatens death or imminent danger, yet after it hath taken deep root, the Cure is very difficult, if at all: The Impetigo firſt beginning, and exciting a few Puſtules, and knots of them, perhaps in one or two members, ſometimes admits of Cure, but hardly without a moſt efficacious remedy. But if the Diſeaſe proceed ſo far, that the frequent and broad cluſters of wheals appear diſpers'd throughout the body, then ſmall remedies effect nothing, and the great ones howſoever diligently obſerved, will not eaſily perform a Cure. But if the Diſeaſe, maugre all remedies advance daily, and encreaſe at length into a Leproſie, *Celſus* judges it impoſſible to be cured. and therefore we muſt wholly abſtain from it. *Its Prognoſticks.*

There are two chief Indications concerning the Cure of an impetigo, *viz.* Preſervatory, which reſpects the cauſe of this Diſeaſe, and the Curatory, which relates to the ſymptomes, *viz.* the puſtulous Eruptions. The vital Indication hath ſeldom place here, unleſs in a deſperate condition, where ſleep and ſtrength fail. The Method of *The Cure.* *Two chief Indications.*

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Curing ought to begin with the Preſervatory Indication, which takes away the Cauſes of the Diſeaſe by inward remedies, for otherwiſe external (as in the Pſora) are never adminiſtred with ſucceſs; but the roots of the diſeaſe in the blood being cut off, the cutaneous ſproutings quickly conſume away: for the taking them away, we muſt proceed in one manner when the Impetigo begins by it ſelf, and in ſomewhat a different manner when it follows an inveterate Scurvy or Pox, being ill or not at all cured. We will conſider each caſe througly by it ſelf, and diſtinctly.

How to be cured, the Diſeaſe beginning of it ſelf.

Therefore whenſoever this Diſeaſe is ſimple, and primary, and being yet New, let the evident and extern Cauſes be removed; let the manner of Diet, and unwholſomneſs of Air be corrected; therefore thoſe that have been lately too much accuſtomed to ſalt Diet, and the fleſh of Pork and Fiſh, let them change to Diet of good Juice and eaſie of digeſtion. They that inhabit the Sea-coaſt, or Fenny places, let them remove to a dry and clear Air; in the mean while let no leſs care be had to their Drink, by declining thick and foggy Ale, and ſmall acid and Wines too much abounding with Tartar: at length let care be taken leſt their Drink or Food be dreſſed with any Mineral waters that are apt to petrifie.

The evident cauſes to be firſt removed.

The conjunct Cauſes how taken away.

Secondly, In reſpect of the conjunct and procuring Cauſe, there are two chief Intentions of Cure, *viz.* that the impurities of the bowels and humours be quickly purged out; alſo that the acid ſaline diſtemperatures of the blood and nervous Juice be altered (whereby the Tartarous matter may be the leſs engendred in them;) for theſe purpoſes Medicines both evacuating and altering are preſcribed of ſeveral kinds. Notwithſtanding, becauſe not all, but the greateſt remedies are here convenient, thoſe which are moſt chiefly of uſe and available, are Catharticks, Phlebotomy, Whey, Chalybeate Waters, Jucy expreſſions of Herbs, Decoctions of Woods, ſteel'd Medicines and Salivation. Some certain Models of each of theſe, and the manner of uſing them, we will annex.

The chief Remedies made known.

1. *A Purge.*

Wherefore in the firſt place, univerſal purging and bleeding being celebrated (as in the cure of the Pſora) we appoint the following Tincture or purging Infuſion, whoſe doſe is from ſix to eight ounces, to be repeated in ſix or ſeven dayes.

A purging Infuſion.

Take of the roots of ſharp-pointed Docks dryed, Polypodie of the Oak, of each half an ounce, Senna ten drams, Epithymum ſix drams, Rhubarb, Mechoacan of each half an ounce, yellow Sanders two drams, Celtick Nard half a dram, Salt of Tartar one dram and a half, put them in a glaſs with three pints of White-wine, water of Elder-flowers one pound, let them ſtand ſtopt in a cold place three dayes, pour off daily as much of the clear liquor as is ſufficient.

2. *Whey.*

Secondly, For ſweetning of the Blood, and waſhing of the Salts thereof, let ſimple Whey, two or three pints, or with the infuſion of Fumitory, Chicory, and ſharp-pointed Docks, be drunk every morning, for twenty or thirty dayes, if the Stomach will bear it, and likewiſe evening and early in the morning, let a doſe of the enſuing Electuary be ſwallowed.

An Electuary.

Take Conſerve of the roots of ſharp-pointed Dock ſix ounces, Crabs-eyes, Coral prepared, of each two drams, Ivory one dram, Powder of Lignum Aloes, yellow Sanders, of each a dram and a half, Sal Prunella two drams, Vitriol of Mars a dram and a half, Syrup of juice of Wood-ſorrel what ſuffices to make an Electuary, the doſe two drams.

3. *Steel'd Waters.*

Thirdly, For the ſame reaſon that Whey, your Iron Mineral waters are preſcribed for this Diſeaſe, and do oft notably help: for when all the other remedies have been in vain, I have with thoſe alone cured a painfull and almoſt leprous Impetigo. Moreover, for more efficacy ſake, let the uſe of Sal Prunella or Vitriol of *Mars*, or of the Electuary but now mentioned, be dexterouſly adjoyned.

4. *Decoctions of Woods.*

Fourthly, In ſome indued with too much Serum, and a watery Conſtitution, where the drinking Whey are Mineral waters or leſs requiſite, it is ſometimes expedient that a Decoction of the Woods be aſſumed at Phyſical hours, and alſo conſtantly inſtead of ordinary drink:

Take the Shavings of Willow half a pound, of Sarſaperilla eight ounces, white Sanders, Lignum Lentiſcinum, of each two ounces, Shavings of Ivory and Harts-horn, of each ſix drams, Filings of Tin, crude Antimony, of each four ounces tyed in a rag, of Liquoriſh one ounce, infuſe them in ſixteen pound of Spring-water, and boyl them to half, keep it ſtrained for uſe.

Fifthly,

Fifthly, Medicines of *Steel*, in that they are every where accounted among the more excellent Remedies, are wont ſeldom to be omitted in this Diſeaſe, although not frequently given with ſucceſs: for moſt Preparations of Steel, wherein the Sulphureous Particles predominate, inaſmuch as they ferment the blood, and irritate it into Critical Effervescences, do cauſe theſe impetiginous eruptions to augment rather than diminiſh; notwithſtanding the Salt, Syrup, Tinctures, and infuſions of Vitriol, inaſmuch as they fix the Blood, and ſomething reſtrain the raging of the Salts, do fitly enough agree with the Intention of Cure now propoſed; but being weak in efficacy, they do not prevail againſt ſo Herculean a Diſeaſe.

5. Medicines of Steel.

Wherefore Sixthly, theſe and many other Remedies nothing availing, many commend *Salivation*, as the ſtouteſt Wreſtler and only match for ſuch an Enemy. Yet the event doth not alwayes anſwer this great expectation; for I have experimented this remedy without ſucceſs in four Patients labouring under a painfull Impetigo, which had reſiſted other Medicines. Some of theſe were provok'd to abundant Spitting by Unction with Quick-ſilver, others by doſes of Solar Precipitate; which they have endured for the ſpace of twenty dayes; which time being elapſed all the ſcaly eruptions and cluſters of wheals have vaniſhed; notwithſtanding, to confirm the Cure, a Diet-drink of the Decoction of Sarſa was appointed, and frequent ſweating under a Cradle, and due purgation between, was continued for a month: Notwithſtanding, this Courſe being finiſhed, when no footſteps of the diſtemper ſeemed to be left, within another month a new ſtock of the ſame Diſeaſe beginning to break out, it encreaſed quickly to its uſual maturity. Moreover when one of them would repeat this courſe, and another after two relapſes would experiment it the third time, both of them at length after great ſufferings of Pain diſpaired of Cure: whence it is manifeſt that the Venereal Diſtemper, although highly malignant, and raiſing moſt filthy Ulcers conſuming the fleſh and bones, is more eaſily and certainly cured than the Impetigo.

6. Salivation.

Salivation does not always cure this Diſeaſe.

The reaſon whereof if we enquire, may plainly be conceived, for that the cauſe of the latter Diſeaſe conſiſts in a malignant and altogether heterogeneous pollution, infecting and poyſoning the blood and nervous Liquor for a certain time, but not altogether overthrowing, or for ever depraving its temperament; wherefore the Cure is performed by Salivation, or a ſudorifick Diet, eradicating all that venom, and then the natural diſpoſition of the blood and humours remains entire: But in a more difficult Impetigo, the Elemental particles and firſt Conſtitutives of the blood are corrupted, inſomuch that unleſs the natural Diſpoſition and Conſtitution of theſe are reſtored, all Evacuations and expurgations of any venemous, malignant and heterogeneous matter, however plentiful and eradicative, do little or nothing prevail. Wherefore, many famous Phyſicians not undeſervedly judg'd this Diſeaſe being confirmed and raiſed to the borders of a Leproſie, to be hardly or never cured.

Why the Impetigo is more difficult of Cure than the Pox.

Secondly, No better event attends this malady enſuing upon an inveterate Scurvy; perhaps hence the intentions of healing are a little more certain when this diſtemper is placed as the Baſis or root of that; to wit, that the chief curing Indication being taken from thence, we muſt chiefly inſiſt upon Antiſcorbutical remedies; but the more ſharp and hot of this kind, as the Garden Scurvy-graſs, Water-creſſes, the Horſe-rhadiſh, Pepperwort, and others too much irritating the blood, inaſmuch as they diſſolve the temperament thereof more, and drive out more plentifully the Tartarous Coagulum to the skin, are always diſcovered to be more prejudicial then advantagious; and for this reaſon, the uſe of Baths, or bathing in hot waters, which namely evacuate the humours of the whole body by an abundant Evaporation, and cleanſe the pores of the skin, and ſeem very available in this malady, often-times are ſo far from helping, that thoſe Eruptions are wont to be exaſperated from thence and very much encreaſed: for I have known many not extreamly Impetiginous, to have gone to our Baths, to bathe in the hot waters, that have returned altogether Leprous. Wherefore, when the Symptoms of this diſtemper ariſe from a ſcorbutick evil, all elaſtick things are to be avoided, and only the more temperate, endued with a Nitrous, Vitriolic or volatile Salt, are to be adminiſtred. We will lay down ſome Models of each ſort; As firſt Cryſtal Mineral, Juices of ſome Herbs and Decoctions, Salt and Mineral purging Waters, are moſt predominant with a Nitrous Salt.

Impetigo ſucceeding a Scurvy, how to be cured.

Hot antiſcorbuticks do not agree.

Nor Baths.

But only the more temperate Remedies endued with a nitrous, vitriolick or volatile Salt.

Take of Cryſtal Mineral, or Nitre purified one ounce, Flowers of Sal Armoniack one dram, bruiſe them in a glaſs Mortar, give one dram three or four times in twenty four hours.

Forms of Nitrous Medicines.

Take

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Take of the leaves of Houſleek the greater two handfuls, bruiſe it and boyl it in two pound and a half of new Milk till it turn to Curds and Whey, ſtrain it, and take a pint of the clear liquor twice in a day.

Water of Sow-thiſtles.

Take of the leaves of Dandelyon ſix handfuls, bruiſe them, and put them into a glazed earthen pot with a cover, which put in an Oven after the bread is drawn out, let it ſtand ſix or ſeven hours, then pour it through a Strainer, the doſe is four ounces to ſix of the clear liquor, thrice or oftner in a day.

Cucumbers.

Cucumbers being endowed with a Nitrous quality are advantagious by experience againſt this diſeaſe, wherefore in lieu of a Sallad let them be plentifully and often eaten; moreover three or four of them cut into ſlices, let them be infuſed, and ſtopt cloſe, in three pints of Spring-water all night; to the clear liquor poured out, add Sal Prunella two or three drams, the doſe is half a pint thrice or oftener in a day. For the ſame purpoſe Decoctions of the leaves in running water together with the fruit do profit.

Purging Mineral Waters.

1. Certain mineral purging waters, of which ſort are chiefly thoſe of *North-hall*, an Analyſis being made up by Evaporation, manifeſtly ſhew a Nitrous Salt with which they are imbued, and I have ſometimes found the daily drinking about four pints for many dayes, to help againſt a gentle Impetigo.

Vitriolick acidule waters.

2. But as I have before hinted, thoſe Mineral waters endued with a vitriolic Salt, of which kind are the *SPAW*, and *Tunbridge*, and *Aſtrope* Wells, do far excell thoſe Nitrous, and all other Remedies, and do more prevail in the Cure of an Impetigo. To thoſe Patients that have not the opportunity of uſing theſe waters, I uſed to give with good ſucceſs againſt this diſeaſe common water impregnated with our Steel, and ſo rendring moſt exactly the guſt of thoſe Mineral waters. By reaſon of Mineral Salts, or at leaſt the Mercurial Particles in them, Tin and Antimony are oft in uſe in the Cure of the Impetigo, and are uſually preſcribed with other remedies. Let the Filings of Tin, and Powder of crude Antimony, be infuſed in Ale for ordinary Drink: alſo Decoctions of *Sarſa* made with the woods, are found beneficial againſt this Diſtemper,

Medicines of Tin and Antimony.

3. Medicines endued with a volatile Salt.

3. The uſe of a Viper, and the Preparations thereof, doth enough commend the wonderful vertue of volatile Salts in a grievous Impetigo, and alſo in curing the Leproſie it ſelf. This Antidote of that Diſeaſe is reported to be found out firſt by a caſual experiment, inaſmuch (as *Galen* reports) that drink being pour'd out of a Bottle wherein a Viper was put to poyſon one labouring with an Elephantiaſis, and ſo given him to free him from his miſery, prov'd his remedy, and what was deſtined for his murder, diſpatched an incurable Diſeaſe. Hither relates the Analogy, taken from the nature of this Animal, whence they collect that it helps in this Diſeaſe; becauſe the Viper yearly ſhakes off his ſcaly Coat, therefore ſome thinks its particles prevalent to throw off the leprous skin of a diſeaſed man; but though we do not attribute much to theſe things, yet it is manifeſt by frequent obſervation, that remedies of a Viper do profit in the Impetigo and Leproſie; the true reaſon whereof ought to be aſcribed much to the volatile Salt wherewith this Animal is endued. For the particles hereof deſtroy the fixt and acid Salts predominating in the blood of the diſeaſed, and diſſolve their combinations; notwithſtanding, the Salt, Spirit, and Oyl chymically extracted out of Vipers, by reaſon of their elaſtick particles, contracting an Empyreuma from the fire, profit not in this diſeaſe; as alſo neither *Spirit* not volatile Salt of *Harts-horn*, *Soot*, *Blood*, and other the like *Armoniacks*; becauſe by violently ſtirring the Blood and Humours they rather diſſolve their temperament, and thruſt forth the Corruptions more plentifully into the Skin. Wherefore the more ſimple Preparations of Vipers, as broths from their fleſh boil'd in water, and Drinks impregnated by Infuſions, and Decoctions, and Powders being made of them dryed and beaten, are preſcribed more ſucceſsfully againſt this Diſeaſe. Moreover not only the boyl'd fleſh of Vipers, but of any other kind of Oviparous Snakes being taken in lieu of ordinary food do oft afford notable relief.

Chiefly prepared of Vipers.

But not chymically.

Broths and infuſions of Vipers.

4. How the Impetigo following the Pox is to be cured.

4. The Impetigo or ſcaly eruption of Pimples, and formed as it were into cluſters, is ſo frequent and familiar a ſymptome of an inveterate Venereal diſtemper, that we firſt ask the Patient whether ſomething of that malignity be not concealed of which they are conſcious; and if we perceive the matter ſuch, all Specificks againſt this Diſeaſe, and Antiſcorbuticks being omitted, we muſt come to the Decoctions of Woods, and thoſe little or nothing helping, we muſt deſcend to the uſe of Quick-ſilver. And truly by this method I have cured many that were accounted Impetiginous and Leprous, (who have been handled long in vain, and wretchedly vexed with other Remedies appropriate to theſe diſeaſes:) But we refer this ſort of

of Impetigo to the Pathology of the Venereal diſtemper, whereto it is an Appendix. PHAR. Part. II.

II. The ſecond Indication curatory relating to the Diſeaſe it ſelf, and the primary ſymptom, to wit, the ſcaly eruptions and cluſters of Puſtules, preſcribes Topical Remedies to be applyed to the outer Skin for the removing theſe effects; for which purpoſe in the firſt place Baths and Liniments are convenient: which yet rarely or never help of themſelves, unleſs the procuring cauſe, that is, the Tartarous diſpoſition of Blood be firſt purged out. *The ſecond Indication Curatory.*

There is a vaſt medley of Topicks of this ſort vulgarly vented, as well by Phyſicians as by Empiricks and Quacks; among all which notwithſtanding, Baths or Liniments compounded of Tar do far excell all other Remedies of either kind, inſomuch that we ſhould only uſe theſe but for their ill ſavour; wherefore we will annex ſome models of Compoſitions both with and without Tar. *Topicks of Tar are the beſt.*

Wherefore, for Baths it is common to take water out of Tubs wherein Tar hath long ſtood, and impregnated with the infuſion thereof: Or,

Take of Tarre two pound, and with white Aſhes ſifted incorporate it into a groſs maſs, which boyl in a ſufficient quantity of Spring-water, adding leaves of Ground-Ivy, Fumitory, white Horehound, the roots of ſharp-pointed Dock, Enula-campane, of each four handfuls, make a Bath to be uſed with government; Or let ſuch a Decoction be prepared without Tarre for Patients abhorring the ſmell.

Sulphureous Baths as well Natural as Artificial are found by experience leſs appropriate, yea for the moſt part the former do prejudice; Moreover, every bathing ought cautiouſly to be adminiſtred: for becauſe this adminiſtration exagitates the blood, and puts it into an Effervеſence, its Temperament is endangered (as has been ſaid) rather to be diſſolved, and the corruption to be ſpread more plentifully over the Skin. *Baths.*

2. *Liniments* whoſe uſe is more ſafe, and convenient, are of a Triple kind or degree, *viz.* Gentle, Indifferent, and moſt ſtrong; of each of theſe we will propound one or two patterns. *Liniments.*

1. Firſt therefore in a ſlighter Impetigo, when the Eruptions and Cluſters are ſmall, Faſting Spittle is commended; likewiſe the weeping of green Wood in the Fire, alſo mere rubbing them with roots of ſharp-pointed Docks bruiſed and macerated Vinegar: Or, 1. *Mild Liniments.*

Take of Oyl of Tartar per deliquium, *Oyl of Nuts or Almonds by expreſſion of each equal parts, make a Liniment to be uſed to the parts affected twice in aday.*

2. Liniments of the Second kind have Tarre for an Ingredient, which is eſteemed above all. 2. *Stronger, of Tar.*

Take of Oyntment of Roſes ſix ounces, of Tarre two ounces, melt them together: Or,
Take a fat piece of Weather-mutton, which ſtick with the roots of ſharp-pointed Docks, ſpit it and roaſt it, and in the mean while baſte it with Tarre dropt leiſurely upon it; the Dripping being received in a Veſſel under it, keep it for an Oyntment moſt excellent for an Impetigo.

3. The moſt prevalent Liniments are Mercurial, *viz.* thoſe made with Quickſilver or Præcipitate. Let the model of the former be that preſcribed already againſt the Scab; for the other, 3. *The ſtrongeſt of Mercury.*

Take of white Præcipitate three drams, Oyntment of Roſes three ounces, mix them, for to anoynt the parts chiefly affected.

The uſe of theſe ought chiefly to be ſuſpected in this Malady; for if ſpitting be raiſed, that great glutt of matter impacted in the pores of the Skin will be moved, which if the whole together ruſhing too much towards the *Ductus Salivales*, gather about the parts of the Throat, will endanger ſuffocation.

Some years ſince a Virgin of a Noble Family, being of a hot Temperament, and endowed naturally with a ſharp and ſalt blood, after being a long time obnoxious to an Impetigo, almoſt from her Cradle, about her riper years began to be afflicted more grievouſly; for the cluſters of ſcaly Puſtules covered not only her Arms and Thighs every where, and the other covered parts of her body, but Alſo her Hands and Face were ſo defiled, that ſhe was aſhamed to appear abroad or converſe with others of her rank. Leſſer remedies almoſt innumerable were exhibited without ſucceſs; *A notable Relation.*

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ceſs; by uſing Baths ſhe at firſt appeared releived, but at length grew worſe thereby. *Aſtrope* Wells which have cured ſome, afforded her little or no relief. Wherefore when all ordinary means would not effect any thing, I propounded Salivation, as a remedy more prevalent then all the reſt and (as it is accounted) the laſt. When the Parents and Patient readily conſented to this advice, preparing her body duely by Purgation and Phlebotomy, I gave her (after our manner) Pills of Solar Præcipitate two dayes, and after the interval of one day, the remedy being repeated the next, an abundant and laudable ſpitting began, and continued for a month without any ill ſymptome; to keep which in its due tenour, I applyed a Mercurial Oyntment to the bending of the Joynts and the places moſt affected, one while to one, another while to another. Before the finiſhing of this courſe, all the Eruptions vaniſhed; notwithſtanding to confirm the Cure, as alſo for the extirpation of the Mercury, ſhe remained another month in Purging, Sweating, and Diet of the Decoction of *Sarſa*, *China*, &c. in which time ſeeming perfectly cured, ſhe ſo remained for about forty dayes. But afterwards though ſhe obſerved an exact courſe of Diet, the ſame diſeaſe began to bud forth again, and leiſurely encreaſing, at length it advanced into its former ſtate. I being confounded with this event, perſwaded her to hope an alteration for the better after her Menſtrual Flux, which was ſuddenly expected. Notwithſtanding, after long delay that Criſis at length happening, and managing her ſelf regularly after it, brought no Cure or eaſe of that Diſeaſe, but rather a freſh aſſault. Wherefore recourſe was had again to Phyſick and divers Remedies aſſay'd, all which when they became fruſtrate, her friends importuned that ſhe might ſalivate again, to wit, allured by this hope, that that method which cured for a ſhort ſpace, being adminiſter'd again, would cure her either for a longer ſpace or altogether Wherefore according to their wiſhes, the ſame courſe of ſpitting and ſweating repeated for two months ſpace, and thereupon the Puſtules every where going off, the Noble Virgin ſeem'd again wholly to recover her health. But within a fortnight after the courſe finiſhed, the Puſtules, and their Cluſters again appeared, and leiſurely encreaſing daily in number and bulk at length grew fouler then before, inſomuch that like an *Hydra*, after the loſs of one head this diſeaſe received ſevenfold.

Salivation cures for a time the Impetigo, but with a relapſe.

That remedy repeated, did not thoroughly cure the Diſeaſe.

I knew another ſtrong man endowed with a luſty habit of Body, who after he had laboured with an Impetigo many years, the malady ſtill encreaſing, and being advanc'd to the higheſt, he was covered all over with a white Scurf, as it were leprous, that every night the Scales fell off like Bran in great plenty in his bed, and might be gathered up in heaps. This man for Cures ſake firſt tryed the ordinary Remedies of every kind, notwithſtanding without ſucceſs; and afterwards trying a lighter Salivation, found himſelf nothing better: but afterwards the ſame method being repeated, by a long and painful Spitting, he ſeemed to be reſtored to health; but within three months the ſame diſeaſe budding out, in a ſhort ſpace arrived to its former outragiouſneſs; Moreover, when he had undergone the third time that moſt painfull Remedy, that affect, which ſeemed expulſed for a certain time, returned again; and afterwards maugre this and all methods, it exercis'd its Tyranny during the Patients life. It will not be requiſite here to diſcourſe any thing of the *Lepra*, which being only a more intenſe degree of the former Malady, for the moſt part admits of no Cure. As to what relates to other Tumours, and their manifold kinds, and the Ætiologies or Reaſons of each, I confeſs I am ſcarce able to contain my ſelf, but that I ſhould enter upon that pleaſant Field of Speculation. But this ſeems as irrational and unuſual, as for one wearied with a long Courſe, and breathleſs at the end, running beyond his Poſts preſently to begin a new Race.

FINIS.

A TRACT OF THE SCURVY.

CHAP. I.

The Contents.

A Deſcription of the Scurvy. The Internal and neareſt Cauſe of it is chiefly in the Blood, and alſo in ſome part radicated in the Nervous Liquor.

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THere is ſo rare Mention, and ſo ſlender Deſcription in the ancient Medicine of this Diſeaſe, which we call the Scurvy, that ſome have doubted, whether there were in the times of old any ſuch Sickneſs, though now epidemical in many places, and almoſt every where ordinary, and with which every one is troubled, or at leaſt thinks himſelf troubled with it; and which like the Pox and the Rickets, is derived a great way down to the Children: but certainly it is plain by the teſtimonies of *Hippocrates*, *Areteus*, *Pliny*, and others, that this Affection though known by other Names, was taken notice of by the Ancients, and that its cure hath been treated of though after a ſlender manner.

Being not very ſolicitous concerning the appellations of this Diſeaſe, we will preſently proceed to the knowledge and application of its Nature: which as it is ſo diffuſe and extends its ſelf into ſo various and manifold Symptoms, that it can neither be comprehended by one definition, or ſcarce by a ſingular deſcription, it will ſeem beſt firſt of all to recite all the *Phænomena* of this Diſeaſe, or to relate the Hiſtory of the more notable accidents of it, and thence to accommodate a certain *Hypotheſis* for the right ſolving its appearances.

A recital of the chief ſymptoms of the Scurvy.

As to the firſt, there are reckoned up a great company of Symptoms in the Scurvy, and manifold Affections and of diverſe kinds; and which ſometimes are of an oppoſite or contrary nature to it: yea if any unuſual accident, never before heard of in an humane Body happen, when it cannot be referred to any other kind of Diſeaſe certainly, we preſently without doubting pronounce it the Scurvy: ſo that this Diſeaſe, like one condemned, and of an evil Name, ſuffers for others

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faults: In the mean time it is wont to excite ſymptoms very many from its own power, which appear almoſt in every part of the Body, a recital of which will be beſt performed by a diſtribution of the parts of the Body. Therefore that we may thorowly handle the marks of the Scurvy, from the beginning to the end, we will begin firſt from the fountain of it in the Head: and to this belong great and habitual Headaches, and thoſe either by certain fits, or at certain times, ſometimes a numneſs or ſtupidneſs of Spirits, ſometimes pertinacious Wakings, frequent Giddineſſes, and Swimmings in the head, Convulſions, Palſies, plentiful Spittings, Ulcers in the Gums, a looſneſs of Teeth, a ſtinking in the Mouth. Secondly, ſometimes in the region of the Breaſt, pains in divers parts of its membranes, and chiefly about the *Sternum*, which being often ſharp and piercing, do miſerably torment thoſe labouring with this Diſeaſe night and day, a frequent *Aſthma*, difficult and unequal breathing, a ſtraitneſs of the Breaſt, a ſtriving with an empty Cough and inordinate Pulſe, a trembling of the Heart, frequent Swoonings, and often faintneſs of Spirits, or a fear of it almoſt continual. Thirdly, this Diſeaſe, as it were fixing its chief ſeat in the lower belly, produces an Iliad of Diſeaſes: for often they have Nauſeouſneſs, Vomitings, Belchings, gnawing at the Heart, Inflammations, and grumbling of the *Hypochondria*, often Colicks, and troubleſome Griefs running up and down here and there, almoſt a continual *Diarrhœa* or Looſneſs, ſometimes a Dyſentery or Flux, or a deſire of going to ſtool, a waſting away of the Fleſh, and ſometimes an *Aſcitis*.

In the Head.

In the Breaſt.

In the lower Belly.

The Urine, for the moſt part red and lixivial, with a cruſtineſs ſwimming in it, or elſe ſticking to the Urinal: ſometimes alſo by fits it is pale and wateriſh and in abundance. Fourthly, beſides theſe Affects of the Belly, there are wandring pains and thoſe not ſeldom highly painful, and troubling chiefly at night in the external Members, yea thorow the whole habit of the Body they feel a heavineſs and ſpontaneous wearineſs, a waſting of the Fleſh, an ach about the Loyns, and a debility and enervation of other Members; in the Skin ſpots of ſeveral colours, Tumours, Pimples, and often venemous Ulcers ſhew themſelves about the Muſcles: a Numneſs, Stifneſs and pricking, and as it were the aſcenſion of a cold air, Alſo Contractions, and leapings of the Tendons: Beſides to ſcorbutical Perſons happen inordinations of the Blood, uncertain Effervеſcencies, wandring Intemperaments, erratick Fevers and great Hæmorrhagies. Beſides theſe more common and accuſtomed ſymptoms of the Scurvy, of which ſome have more ſome leſs, and which infeſt them now after one manner, and now after another manner, and in another kind, oftentimes there happen other unaccuſtomed and prodigious accidents to this Diſeaſe.

In the outward Parts.

The evident cauſes of the Scurvy.

For the more full knowledge of this Diſeaſe, it ſeems good that we here obſerve as it were lightly, what concerns the original, beginning or firſt invaſion of it. For we are to inform you, that the Scurvy may be produced by reaſon of ſeveral Cauſes and Occaſions: for although an ill courſe of Diet, a ſedentary life, the inordination of the Spleen, and the Crudities heaped up in the firſt paſſages are very much accuſed; yet there is wont to be a further cauſe, as the unwholſomneſs of the Air, and the evil *Craſis* of the blood, vitiated by former Diſeaſes: wherefore the Scurvy or Scorbute is often venacular or peculiar to mariſh places, and to the Sea Coaſts: and frequently falls on thoſe who much uſe the Sea, and feed much upon ſalt and ſmoak-dry'd Meats, and who are forced to drink putrrified Water: and often ſucceeds to continual Fevers, and to other chronical Diſeaſes ill cured; alſo to great Hæmorrhagies and other evacuations; and to uſual excretions, as the Piles and monthly Courſes being ſuppreſſed: Moreover this Diſeaſe, without any great forerunning cauſe, is excited not ſeldom by contagion, and ſometimes is alſo hereditary.

The cauſe of the Diſeaſe diffuſed thorow the body ſticks either.

It manifeſtly appears from what we have obſerved concerning this ſcorbutick Affection, that the material cauſe of this Diſeaſe is not contained in any private place or ſingular Mine, but is diffuſed thorow the whole body and every part of it, both within and without: from whence we gather that the ſcorbutick Miaſm or Contagion, is poured forth, either in the Blood or in the Nervous Juice or in both. And indeed, the eruptions of Spots, and little whelks, the redneſs, and as it were lixivate urine, or like lie, plainly teſtifie the Contagion to be placed in the effervency and inordinateneſs of the Blood; to which another like prognoſtick may be added, the divers production of this diſeaſe, which for the moſt part, ſucceeds the depravation of the Maſs of Blood: no leſs the troubleſome dolors, both within in the Membranes & without in the Muſcles, the debility of the Members or reſolutions, the *Vertigo*, Cramps, and frequent faintings of the Spirits declare the fault or vice to be in the nervous Juice. Therefore, when both the general Humours are in fault, we will ſee which is firſt and chiefly vitiated, and from whence it draws its Contagion, and by what means it communicates its harm to another humour, and to any other parts, that are wont to be affected.

To the Blood or to the nervous Juice or both.

As

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The Dyscrasie of Blood and Wine Compared.

As to the Blood (in whose mass the Scurvy seems most of all to be rooted) we have elsewhere shown, that its disposition is even almost of the same temper, and of such like particles composed, as Wine: for that we have hinted, the Blood, even as Wine, to be sick, chiefly from two causes, to wit, either, because that there is something extraneous, and not to be truly mingled with it, poured into one or the other, or else because the disposition of the Liquor, or its temperament is perverted, that is, for as much as some things that are to be in Subjection, either to one Element or to another, and which ought to be subjugated, are exalted.

As to things not miscible poured into either.

As to the first we have observ'd of some, that when the *faces*, are first secreted, and thrust up from the bottom, they are by being moved, lifted up; or if any exotick thing be cast into the Pipe, as Sewet or Sulphur, presently a notable perturbation is stirr'd up; by which, unless it be soon quieted, the whole *Crasis* of the Wine will be in danger to be subverted. In like manner there are many things not miscible, which disturb the Motion and Circulation of the Blood, by being poured into it, and hinder it, that it cannot perform its due œconomy, the nutritious Juice being full of the feculencies, does inordinately ferment the Blood, and as we have formerly shown, that Liquor becoming degenerate stirs up the paroxysms of intermitting feavers; the vaporous Recrements of the Blood, the serous, bilous, and melancholy being retained in the bosom of it, bring forth Catarrhs, Dropsies, Jaundice, Mellancholly, and many other Diseases: but if that extraneous thing be removed in time, it soon, even as VVine freed from its extraneous mixture, recovers its pristine Condition. But either Liquor, being for a long time infected with those heterogeneous contents, so that the due *Crasis* is at length degenerate, it is not then easily to be restored.

As to the temper of either variously altered.

2. Besides, both Wine, and Blood, by reason of many other causes, depart from their right Temperament. As to Wine there are many ways and reasons whereby its Liquor is perverted from its legitimate disposition: which may also be parallel'd, by as many, if not more, in the dyscrasie of the Blood. (For this is often wont to be suddenly empoyson'd and broken, which does not easily happen to Wine) 1. Therefore, we may observe of Wines, that they do not sometimes attain to maturity, but for want of Spirit they remain crude, for as much as the Spirits, and the other active principles of Sulphur and Salt being overwhelmed with more thick and gross parts, cannot extricate themselves; wherefore they become without Spirit, but having a thick consistence, and ungrateful, taste degenerate into a tastless VVine: and almost after the same way it is, when the Blood, the Spirit, and Sulphur depressed becomes crude and watry, and without Vigor, and unable to be inkindled afresh in the Heart. And this kind of disposition of the Blood *Horstius* affirms to be the cause of the scorbutick affection; but this same disposition, seems rather to infer the *Pica*, or strange longings of women with child, as also the Dropsical disposition, than the Scurvy, as we shall shew more at large anon. 2. The sulphurous parts of Wine being exalted above the rest, cause an immoderate effervescency or ebullition in the Liquor, and is called in our idiom or proper Speech, *Fretting of Wine*: In like manner, the sulphureous parts of the Blood being too much provoked or carried forth, causes a feverish intemperance, and is apt to be inflamed in the Heart, and indeed is the cause of very many feavers together. 3. Not seldom the Spirit in Wines growing weak, and the Sulphur being bound up, the saline part being carried into a flux overcomes the rest, wherefore the Liquor becomes sour. The famous *Sennertus* thinks the Blood in the Scurvy to be altered as VVine degenerated into Vinegar, which we shall shew by and by, to be otherways. And we have formerly shewed, the dyscrasie of the Blood, being grown sour, causes Mellancholy.

The Scorbutick Dyscrasie of the Blood-like Wines when they become,

4. There yet remains another ill disposition of Wines, to which we may very aptly compare the scorbutick Disposition of the Blood, to wit, when the Spirit being depressed, the sulphureous and the saline Particles being combined together, are exalted, and as this comes to pass in Wines, after a two fold manner, so also by the like affection of the Blood we may deduce from thence a two fold Kind of Scurvy, as we shall shew more clearly anon. It is then a common observation in VVines, that besides their degenerating into a tastless Liquor, and into sour Vinegar, they do sometimes, the Spirit being depressed, and the Sulphur and Salt being together exalted, become rancid, or ropy, or mucilaginous; in proper terms, *Wines that are fretted, or ropy.* In either mutation, the Spirit being subjugated, the sulphureous and the saline Particles being associated together, exceed the rest of the Elements, and cause the disposition of the Liquor, to become of their Nature. But yet the business is not performed, altogether after the same manner, in both: for that in the former dyscrasie of the Wine the Sulphur is something more potent, than the Salt, but in the latter the Salt exceeds the Sulphur: so that either of them being the stronger, their Lord,

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the Spirit, being caſt off; they agree one with the other, and ſurmount the due tenour. The reaſon of either, may ſeem to be unfolded after this manner.

When generous Wines have grown hot for a long while, the particles being much agitated and ſtriking one againſt another, the Spirit partly evaporates, and partly overwhelmed in the more thick Elements, is ſuppreſſed: In the mean time, the Sulphur (of which there is the greater plenty) being more carried forth by the agitation, and ſo caſting off the yoak of the Spirit, adheres to the Salt, and lifting up, alters the mixture of the Liquor, which by reaſon of the riſing up of the Sulphur combined with the Salt, becomes rancid, or fretted: In like manner, when thin Wines have been kept long, the Salt is carried forth, and depreſſes the Spirit, overcome by its *fluor*, and ſo ſubjected by its wat'riſhneſs, the Liquor becomes ſour or ſharp; after that the Salt growing eminent, the Sulphur (of which there is a leſs quantity) cleaving to it, and intimately uniting, converts the Conſiſtency of the Liquor from thin to thick, and as it were of an oily ſubſtance; and from an acid, ſour taſt to a very ingrateful and as it were muſty.

It is probable that after the ſame manner the Blood is altered in the affection of the Scurvy, as Wines, as often as they become too hot, degenerate into fretted and ropy, for it is an argument, that this diſeaſe does not depend ſo much on the feculencies mixed with the Blood (though ſuch ſhould there be, they might be at laſt driven forth, and their ſupplies cut off) but on the habitual dyſcraſie of the Blood; becauſe the Scurvy being radicated, is ſo difficult and ſometimes not at all, to be cured. Moreover we may affirm, the dyſcraſie of the Blood which cauſes the Scurvy, to be two fold, as of the Wine, to wit, a ſulphureous-ſaline and a ſaline-ſuphureous diſpoſition. For as there are very great variety of affections, which are ſtirred up by the Scurvy; yet all of them may be aptly enough reduced to two principal Heads, or as it were two Fountains of evil, to wit firſt, that the blood being touched with the ſcorbutick Miaſm or Contagion, becomes either very fervid or hot, in which the Sulphur having dominion, aſſociates it ſelf powerfully with the Salt: wherefore it being made more rancid or fretting, grows inordinately hot in the veſſels, and perpetually ſends forth from it ſelf aduſt recrements, to wit, concretions of Sulphur and Salt, and diſperſes them here and there, which ſpreading outwardly, produce ſpots, pimples, whelks, or ulcers: but being inwardly laid up, bring forth a diſpoſition to Vomit, pains about the heart, Looſneſs, Fluxes and grievous pains. In this kind of Scorbutick rancidity or frettedneſs of the Blood temperate Remedies only are convenient, and often Blood-letting, Scurvigraſs, Horſe-radiſh, or other things endued with a ſharpneſs and incitation: even by the like means as fretted VVines are cur'd, by diſcharging them from their *faces*, and by pouring into them, Milk, Flower, or Starch, Glew, or other Demulſions or Sweetnings, this is helped. Or in the ſecond place, in blood nouriſhing the Scurvy, Salt has the chief dominion, and aſſociates Sulphur to it ſelf, wherefore it is not ſo fervid, but like ropy Wine becomes thick and mucilaginous, and is ſlowly circulated in the Veſſels, and is apt to ſtuff the *Viſcera* in its paſſage, and to affix there its feculencies as it were mud. Thoſe affected after this manner, for the moſt without any puſtulaes or eruptions of the skin, become ſluggiſh, breathleſs and feeble, and labour with ſpontaneous weakneſs and ſtraitneſs of the Breaſt; and are found to be obnoxious to the paſſions of the Heart, the *Vertigo*, and Convulſions: In the ſcorbutick diſpoſition of this kind, more hot Remedies, and ſuch as are indued with a volatile Salt, yea Chalybeates or ſteel Medicines, which may fuſe and agitate thorowly the Blood, are wont to be moſt uſed, and are to be handled even after the ſame way, as ropy Wines, to wit, to be ſoundly ſhaken and agit agitated; and alſo to them are put Lime, burnt Allum, *Gypſum* or Playſtering, Sea ſalt calcined, and the like, indued with an high acritude or ſharpneſs. So much for the beginnings of the Scurvy radicated in the Maſs of Blood: There yet remains to be unfolded, for what cauſes the Blood degenerating from its proper nature, conceives this or that morbifick diſpoſition, bringing forth the Scurvy. But it firſt behoves us to ſhew by what means the ſeeds of this Diſeaſe lye hid in the nervous Juice, the other general humour.

By what means the ſcorbutick Contagion is impreſſed on the nervous Juice.

We have elſewhere declared that from the Blood driven to the confines of the Brain, there doth diſtil a ſubtle Liquor, both for the matter and for the vehicle of the animal Spirits, and that it doth diſperſe it ſelf every where thorow the *Encephalon*, and the nervous Stock: This *Latex*, ſo long as it is right and good, conſiſts chiefly of Spirit and Salt combined or volatiliſed in it, and with theſe and the *modicum* of Water, wherewith they are waſhed, there ſeems to be little need of Sulphur and Earth: but yet this concretion of Spirit and volatile Salt doth indeed conſtitute the moſt pretious humour which penetrates, paſſes thorow, actuates, and irradiates all things, concerning which the Chymiſts have dreamt of their *Alchaeſt*. At the beginning of the Scurvy, whilſt

whilst the *Crasis* of the Blood and the tone of the Brain are not thorowly vitiated, this watring liquor of the Brain and Nerves, being as yet spirituous, sweet, and not very unfit, performs all the functions to which it is destinated: but afterwards out of the bloody Mass made poor and very much weakned, a much thinner *Latex* and inclining towards Vinegar drops forth: and further, from the fœculented Blood and as it were rancid or fretted or ropy, heterogeneous Particles and very much infested are carried to the animal Regiment, and that being made weak within the Brain, they are admitted without repulse, and thence poured forth with the moistning Juice on its *Appendix*, both medullar and nervous: and from hence in several Regions of the flowing animal Spirits, sometimes faintings and wantings of strength, sometimes painful and spasmodick, or cramplike distractions, and explosions do follow. Wherefore a *Paralysis* or Palsy, Convulsions, *Vertigo* or turning round or giddiness in the head, tremblings and other preternatural Affections of the Brain and nervous Stock, are wont to fall on those who have the Scurvy deeply rooted: concerning which we will hereafter speak more particularly. In the mean time we will take notice in general, that the scorbutick Contagion affixed in the nervous Juice, consists in one of these three or in all of them together, *viz.* that the moistning of the Brain and Nerves becomes much thinner or poorer; or that it degenerates from its saline disposition into sourness; or that it is stuft with heterogeneous Particles.

Hitherto we have shown after what manner the first seeds as it were of the scorbutick Affection are sown in the Blood, and from thence in the nervous Juice. Before we will consider of the fruits or symptoms of the Disease, excited by reason of the evil disposition of either of the humours and the reasons of them, and their manner of becoming so; we must inquire into the more remote causes and differences of the Disease it self: to wit, that it may appear from what causes or occasions, and by what provision the scorbutick disposition is impressed on the aforesaid humours.

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Of the more Remote Causes of the Scurvy, by which its Contagion is affixed on the Mass of Blood, and consequently on the nervous Juice.

HAving shown in the former Chapter, what is the conjunct and neareſt cause of the Scurvy, *viz.* the evil disposition impressed on the Blood and nervous Juice, it now remains, that we inquire into the more remote Causes, by which the Contagion of either humour, and chiefly of that which is chiefly and first in fault, is carried into the Blood: for the depravation of this being detected, it will easily appear, how the morbifick Miasm or Contagion is derived to the other Juice. Therefore as we have determined, that the scorbutick Affection is chiefly founded in the vitiated Blood, and that the evil of it consists, whilst the Spirit is depressed, in that the Salt and Sulphur, as in Wines becoming fretting and ropy, is unduely exalted; we will seriously consider, how this or that disposition is impressed in the mass of Blood.

The opinions of others concerning the original of the Scurvy recited.

But we ought not to pass over what other Authors, diligently searching after the nature of the Scurvy, have determined concerning its Causes and Subject. As there are many opinions of this thing, almost all agree in this respect, that the fountain and origine of this Disease is derived from the fault of the *Viscera*, and the seat of its product is placed in the bloody Mass, to wit, that this being almost only infected with their vitiousness, contracts the scorbutick Contagion. The more Antient did impute the chief cause of this Disease to the Spleen, not rightly performing its office: but as the office of the Spleen was conceived this thing by some, another thing by others, and a different thing by these; they shewed the production of this Disease after a several manner. *Wierius*, *Ecthius*, *Albertus*, *Ronseus*, *Engalenus* with many others, supposing that the Spleen was the receptacle of the excrementitious melancholick Juice separated from the Blood, have determined the internal and next cause of the Scurvy, to be a plenty of lutulent or muddy humour, and of melancholly only, or also of that mixed with others, framing a peculiar form of corruption, which abounds about the Spleen and Liver, and in the Veins themselves. This opinion might deservedly challenge our assent, if it had pronounced the secretion of the melancholick Juice from the Spleen being neglected or hindred, to be sometimes and in part

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part the cauſe of the Scurvy ; but that this Diſeaſe is held to ariſe always and altogether from the default of the *Viſcera*, is very highly improbable ; as will hereafter be made plain, when we ſhall declare the far more potent cauſes of the Scurvy. Other Authors attributing the office of ſanguification to the Spleen, ſay that the Scurvy is produced, for that the Spleen does not turn that part of the Chyle deſtinated to its ſelf, into laudable Blood. But again others, as *Reuſnerus*, *&c.* have thought the more humid and watry parts of the Chyle to be prepared in the Spleen, and to be converted into Blood. Therefore they judged the next and internal cauſe of the Scurvy to be the watry and ſerous humours, which not being received by the Spleen, were poured on the Blood, and ſo produced the original of the Scurvy. In the mean time others, as *Platerus*, *Bauhinus*, *&c.* ſaid that the thicker part of the Chyle being drawn by the Spleen, was the cauſe of ſanguification, and by it too be prepared for it ſelf, and other parts convenient Blood. From this ſuppoſition *Gregory Horſtius* ſaid the cauſe of the Scurvy to be the crude and ichorous Blood in the whole Body, but yet chiefly in the *Hypochondria*, offending not only in quantity but with a kind of ſpecifick corruption, proceeding from the imbecillity of the Spleen, *viz.* becauſe thorow the preternatural Affection of the Spleen, the more crude parts of the Chyle, are not averted from the ſanguification of the Liver, from whence the blood in the veins of the Liver and Spleen is firſt depraved, and then by the Commixtion of ſtrange matter the Sanguification of the Liver is hindred, by reaſon of the object not rightly diſpoſed, for as much as the chyle, by reaſon of the hurt of the Spleen, was not depurated in its juſt meaſure. *Horſ. appen. ad. lib. 2 part. 2 Sect. 1 de Scorbuto.* This opinion eaſily falls to the Ground, becauſe he aſſerts contrary to the Laws of Sanguification, the Spleen to ſanguifie and to draw the more crude parts of the chyle to it ſelf; when 'tis well known, there is no paſſage for the Chyle to the Spleen. Alſo this miſtake is refelled by the opinion of *Reuſnerus* and others, which affirm the next and internal cauſe of the Scurvy to be the ſerous and watry humours which the Spleen ought to draw, and by its peculiar office of Sanguification, to convert into Blood.

The moſt learned *Sennertus*, although with the former he attributes alſo the office of Sanguification to the Spleen, *Inſtitut. lib.* 1. *cap.* 9. yet he derives the cauſe of the Scurvy otherways than from the fault of this *Viſcus*. For he affirms, that by reaſon of the evil Concoction of the Chyle in the firſt paſſages, and being deſtitute of Spirit, ſalt and tartareous Feculencies to be heaped up, about the Meſentery and Cawl, and theſe being continually augmented by the approach of new matter, and moiſtened by the *Serum*, to be at laſt transferred into the Spleen and Liver, and from thence into the Stock of the veins, and ſo in them to infect the whole bloody Maſs, and to render it crude and ſalt. He calls this firſt Mine of the Scurvy, gathered together in the firſt paſſages, a melancholly Humour ; which beſides he ſays to be ſerous, ſtopped up with pituitous humours, and by reaſon of its ſtay in thoſe parts, corrupted after a peculiar manner : Then he adds, that this humour is generated by the fixion of the Spirit and volatile Salt, after the ſame manner, when as wine changes into Vinegar.

The Scurvy does not always ariſe by the fault of the Spleen or the firſt paſſages.

Several Reaſons of no ſmall moment do convince me, that I cannot in all things aſſent to this opinion ; however probable it ſeems. For beſides, that this Doctrine does not exactly quadrate with the Circulation of the Blood, ſince by its Law the humours in the meſaraic veſſels are ſcarcely gathered together apart from the other kind of Veſſels, at leaſt there is not any paſſage for them from thence into the Spleen, moreover it is not rightly determined, that the Scurvy begins only in the firſt paſſages ; for ſometimes it is contracted by mere Contagion. Neither alſo do we think that this Diſeaſe proceeds from the fixedneſs of the Salt, or from the Crudity of the Blood and humours : for oftentimes it ſucceeds to long continued Fevers, and that rather ſeems to proceed from aduſtion and too great deflagration of the Blood, than from any advention of the Chyle and other humours in the firſt paſſages: moreover ſometimes a Sea and mariſh air induces this Diſeaſe, though no Crudities are begotten about the *Viſcera* : and the ſick do not complain from the beginning, of their Appetite and Digeſtion. Indeed wee grant, as to what belongs to the Crudity and the fixity of the Salt, in the Chyme (or ſecond digeſtion) or the Blood, and defect of Spirit, that from theſe cauſes a ſickly Diſpoſition is oftentimes produced, but not therefore preſently the Scurvy, but rather the *Malacia* of longing women, *Pica* of Virgins, the phlegmatick Dropſie, or ſome other dropſical diſpoſition ſucceed. Therefore ſince the Scorbutick Ætiology hath been delivered by Authors, to whom the Circulation of the Blood was not known, and agrees leſs with the Truth, we will open the whole matter with that Key, and to the beſt of our Skill more accurately unfold the cauſes

ſes, both procatartick and evident, of this Diſeaſe, according to the Law of Sanguification. PHAR. Part. II.

We have already hinted that there are many occaſions and procatartick means from which the Scurvy ſeems to deduce its original. 1. In ſome places it becomes national or peculiar, ſo that the morbifick Contagion is drawn in together with the vital Spirit, by reaſon of the evil Influence of the Air, and of the vapours, wherewith it is ſtuffed. 2. Very often this Diſeaſe follows upon long continued fevers, and other Chronical Diſeaſes, and is very deſervedly accounted the effects or products of them. 3. Sometimes it is hereditary, and is propagated by traduction from Scorbutick Parents. 4. Sometimes again it is taken by mere Contagion. 5. An evil manner of living, inordinations as to the things non-natural, an innate or acquired Dyſcraſie of the *Viſcera* ſometimes induce a Scorbutick affection, more often contribute to its birth, or nouriſh the inkindling. We will conſider the reaſons of every one of theſe effects.

1. There is none of the ordinary ſort of People, but confeſſes that the Scurvy is very often contracted by the fault of the Air, and it is almoſt in every bodies mouth, that places neer the ſea ſide, mariſh lakes, and moiſt places, render the Dwellers obnoxious to intermitting Fevers, or the Scurvy: wherefore the ſickly, or ſuch who have any regard to their health, do chooſe their habitations far from ſuch kind of places. Indeed ſuch an humid Air, continually diffuſing filthy exhalations and infection, becomes unwholeſome in a double reſpect, and often brings forth the Scurvy, *viz.* by reaſon of Tranſpiration being hindred: and becauſe of the ſuſception of an incongruous Ferment. For in the firſt place, people dwelling in a thick and not purified Air, have the Paſſages and Pores of their skin much cloſer, or ſhut up: wherefore when the *Effluvia* of the Blood are not duly exhaled, but the ſame retained within, ferments the reſt of the bloody Maſs, and diſpoſes its active particles to various inordinations. Then in the ſecond place, for as much as at the ſame time filthy vapours, ſtinking, incongruous Salt and Sulphurs are ſucked in, by reaſon that the Spirits of the Blood are greatly depreſſed, and in the mean time its ſulphurous and ſaline particles are carried forth to the extremity, and from thence the *Craſis* of the ſanguineous Maſs being by degrees chang'd, it degenerates into an evil diſpoſition. And indeed, the ſulphureous part of which being exalted by it ſelf induces a notable rancour to the Blood; and there is wont to be excited, ſometimes continual, but often intermitting fevers ſo familiar, by the unwholſome air, for the reaſons elſewhere ſhewed. If from ſuch an occaſion (as it very often happens) the ſaline Principle is carried forth together with the Sulphur, ſuch a ſcorbutick diſpoſition as we have above deſcribed, like to fretted or ropy Wine is impreſſed on the Blood. Not only a great tract of humid and vaporous Air, is unwholſome after this manner, but alſo to dwell in houſes ſituate neer any mariſh, or encompaſſed about with a pond or moat, or in houſes new plaſtered with lime, renders perſons obnoxious to this Diſeaſe.

By what means unhealthful Air breeds the Scurvy.

2. A Fever of long continuance, very often induces the Scurvy: the reaſon of which manifeſtly appears from our *hypotheſis*; for from the often, and too much deflagration of the Blood, the Spirits are very much waſted, and like liquor that becomes poor and liveleſs; by its burning, a great plenty of the more pure Sulphur evaporates, and in the mean time what is left of it, aſſociating to it ſelf the Salt, carrying it up, is wont to cauſe the *Craſis* of the Blood to become planely morbid and ſcorbutick. It is to be obſerved, after a long Fever, by reaſon of the Spirit and Sulphurs too much exhaling, and very much of the Salt being for a long time concocted with the remaining Sulphurs, that the Blood becomes very ſalt, and as it were lixivial, ſo indeed that from thence, it is ſcarcely enough inkindled in the heart to perform the circulation: ſuch a diſpoſition of the Blood is not to be reſtored, but by a long time, and is very difficultly hindred from running into the Scurvy. Not only after fevers, but alſo after other chronical diſeaſes, evilly cured, the Scurvy is induced, and that for a double reaſon or means of affecting, to wit, either becauſe the Blood is changed by the preſent diſeaſe towards a ſcorbutick diſpoſition, or becauſe the diſeaſe hinders the ſick for a great while, from any exerciſe, or motion, and from thence they are inclined, by a long Idleneſs and ſitting ſtill, to the Scurvy. The firſt is diſcerned in Melancholly, when by the depreſſion of the Spirit, and the Salt being carried out into a *fluor*, the Blood turns to a Sourneſs. This kind of *Craſis*, the Sulphur afterwards aſſociating with the Salt, and both of them being carried forth eaſily paſſes into the Scurvy. The Hypochondriack Affection is ſo much of kin to the Scurvy, that it very often takes it for a Companion: for the melancholly feculencies, which only after the nature of that affect pollutes the Blood, afterwards perverts its *Craſis*, and renders its ſcorbutick: in like manner the Jaundice and Dropſie which at firſt only infects the Blood by an impure and incongruous Mixture, after a long

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ſtay, quite changes its Temperament. 2. Many other Diſeaſes accidentally induce the Scurvy for as much as the ſick are hindred from any kind of Labour or Exerciſe; ſo that their blood is very little eventilated, but retained, like Wine a long time upon its lees, looſes its *Craſis* or Temperament, and is liable to the inordinations of the Salt, and Sulphur. After this manner the Palſie, *Lumbago*, or feebleneſs of the Loins, the fracture of Bones, Ulcers, Wounds long time in curing render Men obnoxious to the Scurvy.

3. How it is contracted by Succeſſion.

3. The Scurvy is ſometimes contracted by ſucceſſion, ſo as the contagion of the Diſeaſe being derived to Children from their Parents, without any other external or internal cauſes, produces infected fruits exactly like the nature of the ſcorbutick Affection: So have I known Children ſprung from ſickly Parents, to have been affected with wandring pains in their Limbs, an eruption of Spots, an eroſion and rottenneſs of the Gums and Teeth. Beſides it is obſerved, the Children of Parents touched with the venereal Diſeaſe, to be obnoxious to moſt grievous ſymptoms, like to ſcorbutick Affection. The reaſon of theſe ſorts of affections ſeems to conſiſt in this, for that the filthy taint being impreſſed on the genital humour, becomes like empoyſoned ferment, which although it for a long time lies hid, being involved with other Particles, at laſt exerts its power and raiſes up the ſymbolick Elements of Sulphur and Salt in the Blood or nervous Juice, and by carrying them above the reſt of the Particles, inclines to the ſcorbutick taint.

How by Contagion.

4. By the ſame reaſon and means of affecting, the Scurvy is propagated by contagion, *viz.* the Effluvia's proceeding from an infected Body, and entring into the Pores of one that is near or inſpired by the Breath, ferment either the Blood or the nervous Juice, or both of them together: and ſo by carrying up the ſpirituous-ſaline, and ſulphureous Particles, pervert the Temperament or *Craſis* of the Liquor, according to their nature.

How the Viſcera and the firſt ways are in fault.

5. The cauſes of the Scurvy hitherto cited, reſpect more immediately the bloody Maſs, and ſhew the diſeaſe to begin from its *latex*, without any great fault in the firſt paſſages. But leſt we ſhould think this Region, to which ſome attribute all the fault; to be wholly free; it ſeems to be determined according to the judgment of others, that the rudiments of the Scurvy is alſo ſometimes conceived within the *Viſcera* of Concoction, and from thence traduced into the Blood: For when it happens from the Chyle, being for a long time vitiated, that the nutricious Juice becomes incongruous, and is ſtuffed with Particles of enormous Salts and Sulphurs, which it carries to the bloody Maſs; there is a neceſſity that its *Craſis* will at length be changed, & perverted according to the nature of the matter, by which it is conſtantly & daily ſupplied. Wherefore it is obſerved, that thoſe who eat much of ſalt or ſmoke-dry'd Meats, and drink much Wine and ſtrong Waters, by which means Salt and ſulphureous Particles are violently carried into the Blood, are found to be very much obnoxious to the Scurvy: Beſides thoſe who feed much on Swines fleſh or Fiſh, although freſh, but eſpecially on Shell-fiſh, for that theſe Aliments have in them plenty of rank Sulphur and Salt (as may be gathered by the extreme ſtink of their putrefaction) are very apt to fall into the Scurvy, and which is more, ſometimes into the Leproſie. On the contrary, they are not ſo incident to this Diſeaſe, who eat milk meats, raw and unripe fruits, freſh Cheeſe and other abſurd things, which heap up in the Ventricle a great quantity of Phlegm; neither is the Juice nouriſhing the Scurvy, produced from depraved or ill digeſted meats; but ſometimes Aliments fit or convenient enough turn into a morbifick matter by the fault of the *Viſcera*; which indeed happens not always by the fault of the Liver or Spleen, as ſome have thought, for theſe have no buſineſs with the Chyle, but the Stomach it ſelf being endued with an extraneous ferment, perverts every thing that is put into it, and changes it ſometimes into a ſour, ſometimes into a Salt or vitriolick pulp, and it is very likely alſo that the incongruous Juice from the Pancrace, or the cholidical paſſage, may be mixed with the Chyle, and imbue it with an heterogeneous tincture. We do not deny but that the Spleen and the Liver do not ſeldom contribute to the production of the Scurvy, but yet not the Chyle but more immediately the Blood ſuffers for their faults when the Liver is obſtructed; ſo that the aduſt recrements of the Blood are but little or ſmally ſeparated, by reaſon that its Maſs being more feculent, becomes too luxuriant with the particles of Salt and Sulphur concocted together. As to what relates to the Spleen, it is not altogether undeſervedly, that ſo many complaints are exhibited againſt it, as to the production of the Scurvy: For as the office of this Bowel (as we have before ſhewn) conſiſts in this, that it doth receive and ſeparate both the atrabilary or melancholly feculencies of the Blood, which conſiſt in a fixed Salt and Earth, and alſo that it digeſts the ſame by a further concoction into a ferment, to be mingled again with the Blood: If then at any time the Spleen does not rightly perform

form theſe its Offices, the maſs of Blood is wont to be infected in a double reſpect: to wit, either becauſe the atrabilary or melancholly fæculencies are not wholly received by the Spleen being obſtructed or debilitated; or becauſe being received, the ſame are perverted into an unfitting and corruptive ferment of the Blood: After this manner and ſometimes after that, the ſanguinious Maſs becomes evilly diſpoſed, and not rarely by this only occaſion, or by the acceſſion of other cauſes, degenerates into a ſcorbutick diſpoſition: And indeed from ſuch a foregoing cauſe, we have formerly declared the hypocondriack affection to ariſe, to which truly the Scurvy (as even now we hinted) is ſo near a kin, that it moſt often is a companion with it, or follows hard after it. But it plainly appears by the obſervation before cited, that the Scurvy does not always and only ariſe from the fault of the Spleen: For ſome time paſt there was a noble Gentleman, who for many years had laboured under a ſcorbutick affection, accompanied with very many and grievouſly horrid Symptoms; The Phyſitians whilſt they had this Gentleman in cure, concluded his ſickneſs to be contracted by the fault of the Spleen; and all thoſe heavy evils to come upon him for the ſake of that Bowel: At laſt after being afflicted almoſt with continual pains, for the ſpace of ten years, and alſo with the *Paralyſis* and miſerable Convulſions, waſting away, he died with a Conſumption. The Corps being opened, it appeared to the ſenſe, that the Spleen ſo evilly defamed was free from all fault; for this inward was very laudable in figure, magnitude, ſubſtance, and colour, and without any tumour or obſtruction: Beſides, the ſanguiferous Veſſels being opened and freed from their ſtuffings, the nervous Fibres appear'd firm enough, and the Blood contained within the pores of the Spleen, free from corruption.

Wherefore ſadneſs and immoderate Studies beget the Scurvy.

Among the cauſes of the Scurvy, that are wont to be derived from the inordination of the *non*-naturals, we may here deſervedly place ſadneſs, for it is every where obſerved, that men, through ſome occaſion ſtruck with ſorrow, and ſo remaining for a long time ſad, do become ſcorbutick. The reaſon of which ſeems to be this, great ſadneſs immediately affecting the inferior or bodily Soul, compells inwardly both its parts, to wit, the ſenſitive and the vital, ſtraitens their *Syſtaſes* or conſtitutions, inhibiting their wonted expanſions, and draws them into a leſſer ſpace. Hence the Animal Spirits being hindred from their due expanſion, remit their Oeconomy, wherefore the Blood repeating its Circuits in a leſſer compaſs, is apt to be heaped up about the boſom of the heart, and there to ſtagnate for this reaſon, when the Spirits of either Government, *viz.* either animal or vital are depreſſed, and the Blood and nervous Juice begin to be altered in their complections, either of them by degrees loſing their vigor, turns from a generous Liquor to one four and liveleſs: Beſides, the *Viſcera* of Concoction being denyed the wonted influx of Spirits, perform very untowardly their Offices. Hence from the Chyle not rightly concocted, or being depraved in its coction, the nutricious Juice being ſtuffed with feculencies, becomes vitious; and is poured on the bloody Maſs, whereby it more perverts its *Craſis*, and cauſes it eaſily to paſs into a ſcorbutick diſpoſition. Moreover for this reaſon, immoderate and too ſerious ſtudies, and the continual intention of the mind, for as much as from hence the Spirits being depreſſed, and the offices of the *Viſcera* ſubverted, the chief *Craſis* of the humours altered for the worſe, they often acquire a ſcorbutick taint: To which we may add, that both ſad and ſtudious perſons, for the moſt part lead a ſolitary life; for which cauſe, both the Blood and nervous Juice, as water wanting motion contracts mud, is wont to be vitiated and ready to fall into a ſcorbutick corruption.

The ſcorbutick taint is derived from the Blood to the Brain and nervous ſtock.

Theſe are, if not all the procatartick or more remote cauſes of the Scurvy, yet at leaſt the chief of them which affix its taint on the Blood; there will not need any other Ætiologie, to ſhew how it is derived from the hurtful Blood into the nervous Juice, for the Blood by its accuſtomed rite and law of circulation, diſtills a portion of its ſpirituous Liquor into the Brain: But as we have before ſhewn, from the Blood depauperated a thin *latex*, and from that a ſharp liquor and ſalt withal, is drawn off after the manner of ſalts when they are diſtilled: Alſo beſides from the feculent Blood, and as it were, muddy heterogeneous Particles, infeſting the animal Kingdom, are brought forth; which notwithſtanding are not eaſily admitted into a firm and ſound Brain. Wherefore as ſuch Particles, being received within the *Encephalon*, do induce thereupon paralytic affections or Cramps; ſome cauſes precede, by which the conſtitution of the Brain is debilitated, of which ſort they uſe to be, 1. Its evil hereditary Diſpoſition. 2. Frequent Surfeits or eating too much, immoderate drinking of Wine, noon Sleeps, great Hæmorrhagies, and other occaſions, whereby either the animal Spirits are too much conſumed, or the pores and paſſages of the Brain, relaxed, and too much opened, that they admit of every thing brought from without.

PHAR. Part. II.

CHAP. III.

Of the differences of the Scurvy, also of the Signs, Symptoms, and Causes of this Disease, and chiefly of those which arise by reason of the taint being impressed on the Blood.

The differences of the Scurvy.

FRom the causes of the Scurvy hitherto described, it will be easie to assign the differences of this Disease: For in the first place, this affection may be distinguished according to the twofold Region of the conjunct Cause, *viz.* the Blood and the nervous Liquor, for that it is either of this or that Kingdom chiefly, and is more deeply rooted now in the Blood, now in the nervous Juice. Secondly, according to the double taint of the Blood affected, to wit, as that shall be either sulphureous-saline, or saline-sulphureous, it shall also signifie the Scurvy by divers Names, or it shall be called according to the vulgar appellations, either, bilous or hotter, shewing it self in spots or whelks, and other more apparent symptoms; or Melancholly, whose poyson lying hid, as it were covered with ashes; is known rather by the intrinsick hurt of the faculties, than by outward eruptions. Thirdly according to the Original & manner of invasion of the Disease, to wit, for as much as it is received either by contagion, or that it arises through an internal *procatarxis* or remote cause; also according to its various state, it is many ways distinguished, and is either beginning, more perfect, or desperate, and requires a divers manner of Indications as to the Cure, of which we shall treat more largely hereafter. In the mean time, it is our business to recite the signs and symptoms of the Scurvy, and to add the causes of them, and after what manner they happen.

Signs and Symptoms.

The Signs by which Prognosticks or *Indicia* of the Scurvy are taken, are either extrinsick, to wit, certain accidents and circumstances, which till the more certain notes of the Disease appear, give a suspition of it: So we may deservedly think, any one having a very sickly disposition, to have contracted some taint of the Scurvy, if he be sprung from scorbutick Parents, or if he have long conversed with a Wife, or Companions affected with it; or if he live near the Sea Coast or marshy or otherways unwholesom places, or if he should have had before a long Fever or other Chronical Diseases, or if he shall be sensible of help by anti-scorbutick Remedies, and that such ill disposition be without a Fever, or certain signs of any other Disease. Or Secondly, the signs of this Disease are present affects and symptoms, to wit, inherent to the sick body; which sort as they are manifold, are wont to be variously distributed, & reduced into certain Classes, that is to say, for as much as they are proper to the Scurvy, or common to it, with other diseases, also for that they are excited, either about the beginning or in the increase of the Disease, or in its worst state or condition. Further, they are distinguished according as they shall be excited in the various parts of the Body internal or external, also for as much as they may happen either in the Head, Breast, the *Abdomen*, or about the Members or habit of the Body: By this way we have already recounted the scorbutical symptoms. But they may be aptly enough distributed according as they arise, either by reason of their taint, being fixed chiefly in the Blood, or by reason of the faults of the nervous Juice, or by reason of the congression, or as it were conjunct influences of either humour becoming enormous. We shall as much as we can, insist on this method, in reciting and unfolding the signs and symptoms of the Scurvy, although in the mean time, very many affections which seem to proceed from the singular fault of this or that humour, procure some fault of the other humour, to be also a part of the cause: As to what relates to the preternatural affections of the first passages, and the *Viscera* in the Scurvy, although they sometimes proceed from errors in living, yet most often the sicknesses of these parts becoming indeed permanent arise by reason of the Blood or nervous Juice, as shall be declared hereafter in its proper place. In the mean time, we will shew at once how the chief symptoms of the Scurvy proceed from the fault of this or that humour, or conjunctly from both.

1. What kind of Affections arise by reason of the scorbutick Dyscrasie of the Blood.

1. When as the Blood is very much infected with a scorbutick taint, evil symptoms follow for three chief Reasons, *viz.* 1. Because its Liquor being depauperated, wants its wonted vigor; so that it can neither be inkindled in the heart freely, nor be circulated lively and equally: For which Reason, a dejection, and as it were a falling down of the whole Soul, Sadness, Anxiety, difficultness of Breathing, a straitness of the Breast, intermitting Pulse, frequent Swoonings, and inordinate suffusions of Heat and Cold follow. 2. The Blood abounding with feculencies, pours all about its Recrements on the parts which it washes; Wherefore Spots outwardly, Pimples, VVhelks, Pustles and Ulsters are excited.

excited. Hence alſo, Catarrhs, the Dropſie, a ſwelling of the Members, Ulcers of the Gums, Vomitings, Lasks, Fluxes, great Spittings, Sweats, a lixivial Urine, or filled with Contents, as alſo tumors of the *Viſcera*, or obſtructions do not ſeldom follow. 3. A poor and feculent Blood ſupplies the Brain and nervous ſtock with but a vicious Liquor; and ſo by the means of thoſe Parts it communicates its faults: Beſides a depraved Blood does not afford preſently a *Copula* or joynting to the Spirits, every where abounding within the Fibres, convenient enough exploſive for the acts of the locomotive faculty, from whence a ſpontaneous laſſitude, or wearineſs, and impotency to the moving of the parts proceed. PHAR. Part. II.

2. In the Scurvy, the moiſtning juice of the Brain and nervous ſtock, after it is infected with the filthy taint, offends in a treble reſpect. 1. For as much as it declines from a noble and ſpirituous, into a poor and thin Juice, from whence a languor and enervation of the whole Body, and in ſome part alſo an Atrophy proceeds. 2. For as much as this Liquor is changed from a ſpirituous-ſaline, into a ſour, acetous Juice, from whence melancholly and fear, a failing of Spirits, and a ſuppreſſion from their wonted vigor, and alſo almoſt continual griefs and irritations of the nervous parts, and a crackling of the Bones are induced. 3. For that this Liquor is ſtuffed with heterogeneous Particles, and infeſting the animal Regimen; Convulſions, Spaſms, or Cramps, Palſies, Vertigo's, ſoporiferous Affections, or pertinacious VVatchings, at laſt Fooliſhneſs, or Moping, or Madneſs ariſe. *2. How impreſſed on the Brain and nervous Juice by reaſon of the taint.*

3. In a more heavy and inveterate Scurvy, the recrements of the Blood and nervous juice, being depoſited together in divers parts, for as much as they are endued with ſaline Particles, which are of a divers nature, they encounter one with another; and by a mutual ſtriving and effervescency, produce moſt horrible Symptoms. From hence ariſe intollerable dolors, chiefly at night, wandring pains in the Joynts, Rheumatiſms, and other affections of this kind. After this manner, from the double fountain of the ſcorbutick taint, very many Rivulets of evil affections running every where in all parts of the whole Body, create griefs. *3. How by reaſon of the Conjunctevils of either humour.*

4. That yet a more full knowledge may appear, it will not be from the matter, to recount each of the aforeſaid Symptoms, and the reaſons of every one of them, and how they come to paſs particularly to deliver.

1. The firſt ſign of the Scurvy, by which oftentimes a ſuſpicion of the beginning of this Diſeaſe is given, is a ſpontaneous wearineſs, to which are added impotencies as to motion, alſo a debility of the Thighs, and as it were a ſenſe of weight or heavineſs. Theſe Symptoms are wont to ariſe about the beginning of this Diſeaſe, and are derived rather from the fault of the Blood, than of the nervous Liquor, which is as yet ſcarcely infected: But this may be done in a double reſpect, *viz.* in the firſt place, for as much as the Blood being made impure, flings out ſerous feculencies in its circulation, and inſinuates them into the pores and paſſages of the Muſcles, wherewith they are ſtuffed and loaden, ſo that the Spirits being hindred and intercepted, they perform not freely enough nor lively their locomotive exploſions: Beſides, the parts being loaded as it were with a certain Burthen, they are not eaſily and readily moved as formerly. 2. From a vicious Blood, the exploſive *Copula* of the animal Spirit becomes degenerate and weak, wherefore they neither readily accompliſh, or nimbly perform the local motions: We believe in an inveterate Scurvy the impotency as to motion to ariſe alſo from depravation of the nervous juice, and from the want of Spirits. *The cauſe of the Sypmtoms unfolded. Spontaneous wearineſs.*

2. Difficult breathing and a ſhortneſs of breath upon any motion, is a familiar ſymptom of the Scurvy, of which as there are wont to be two cauſes, it depends now upon one now upon the other, and ſometimes on both together. The ſcorbutick *Dyſpnœa* or ſhortneſs of breath, if it be very frequent and almoſt conſtant, comes from the very poor, and as it were, liveleſs ſtate of the Blood, whereby it is indeed apt to ſtagnate, and not to be eaſily inkindled in the Heart: wherefore from any motion, as the Muſcles urge the ſanguiferous Veſſels, by compreſſing every where their contained liquor, the Blood ruſhes ſomewhat more plentifully into the boſom of the heart, which when it is not there preſently inkindled, and carried forth of doors, it lies heavy at the heart, and threatens a decay of the vital function: Therefore the Lungs that they may bring help, are moved more ſwiftly, that the Blood may be drawn forth quickly, and ſo for this end, to wit, the circulation of the liveleſs Blood, and of it ſelf almoſt immoveable, the often and ſhort breathing is cauſed. In this caſe, with laborious breathing there is alſo a quick and ſmall Pulſe. 2. Sometimes the ſcorbutick *Diſpnœa* or ſhort breathing proceeds from the fault of the nervous ſtock, for after the morbid or filthy taint has occupied the Brain and its appendices, the heterogeneous Particles ſent from the *Encephalon*, as they are of kin to other nerves; ſo alſo to other Spirits, to wit, thoſe ſerving to the motion of the *Diaphragma*, and the Muſcles of the Breaſt, come to the Brain; and ſo according as thoſe Nerves are either inhibited or perverted from performing rightly their offices, a difficult reſpira- *Difficult of Breathing.*

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is produced of a various kind,and is for the moſt part either Paralytick or Convulſive: For the morbifick Particles entring into the nervous ſtock, and about their foldings or extremities being more plentifully heaped up, are fixed with plenty of Spirits. Hence it ſometimes happens from ſuch a cohæſion of Particles,(if perhaps they be Narcotick) that the Spirits inhabiting thoſe Nerves,are every where bound and hindred from their deſigned actions: When reſpiration being hindred, other Spirits the gueſts of Nerves yet free,that they may perform the common task by their own ſtrength,are very much ſtirred up,and ſo as much as they may,they cauſe a more frequent and laborious reſpiration.But whenever the Spirits flowing within certain Nerves,for the office of reſpiration are affected with an heterogeneous, exploſive, or ſpaſmodick *Copula* or joynting of the ends of the Muſcles,for the ſake of whoſe preſſing out,when they are excited through plenitude or for other occaſions,they run into convulſive motions: And from thence the Lungs are detained with laborious and often repeated turns, now of *Syſtoles* now of *Diaſtoles*, like to aſthmatick Paroxyſms. In theſe caſes, ſometimes the Nerves of the *Diaphragma*, ſometimes the Pneumonick, and thoſe abſolving the motion of the Breaſt, alſo ſometimes perhaps thoſe embracing the *Bronchia*, ſometimes theſe,ſometimes thoſe apart from the reſt,are ſtupefied or obnoxious to cramplike affections,and for that reaſon the various differences and ways of the anomal or unequal reſpiration occur: Some kinds and examples of which we may add hereafter. I know ſome aſcribe the cauſes of the aforeſaid Symptoms to the Vapours elevated from the Ventricle and its Neighbourhood, whoſe opinion in another place we have deſervedly rejected, with reaſons ſhewn to the contrary.*Eugalenus*, *Horſtius*, and *Sennertus*, whom others follow, deduce the cauſe of the ſcorbutick *Dyſpnœa* or purſineſs,from the *Viſcera* of the lower belly,being inflated or tumefied, and by that means preſſing the Cawl, as it uſes to come to paſs in Hydropicks, and women big with Child. But I cannot aſſent to this opinion, becauſe this ſymptom does not ſeldom happen to thoſe, whoſe Belly and *Hypocondria*, are ſoft enough, and who have the ſinking below the Ribs, and the ſpace for the motion of the *Diaphragma*, free enough, as I have often found upon examination.But, that difficult reſpiration falls upon Hypochondriacks,& ſometimes alſo upon Scorbuticks,upon the perturbation of the Spleen, the reaſon is, becauſe the ſplenick Nerves communicate with the pneumonick: Therefore indeed when either of them are beſet with the morbid, *viz.* the ſpaſmodick matter,and the ſame being moved in either of them, ſtirring up Cramps; draws the others into a conſent of affection,as I have already manifeſtly declared, diſcourſing of the hypochondriack paſſions: In all difficult reſpiration excited by reaſon of the fault of the nervous ſtock, the Pulſe though for the moſt part ſtrong enough, yet becomes quicker than it ought to be, and ſometimes intermitting.

A ſtraitneſs of the Breaſt.

A ſtraitneſs of the Breaſt heavily infeſts ſome ſcorbutick perſons, which kind of ſymptom hath joyned with it a difficult reſpiration,and commonly is aſcribed to the ſame Cauſe, to wit,from the compreſſion of the Caul by the elevated *Viſcera*: But yet though the Breaſt be ſometimes by that means ſtraitned, that thoſe purſily affected can hardly draw their breath, but that the taking in of the breath terminates in the midſt of the *Thorax*, yet ſometimes on the contrary,they draw in the Breath too deeply,ſo that they breath it out again hardly and difficultly: which certainly by no means ought to be attributed to the inequalities of the inferior *Viſcera* in the *Diaphragma*; but either to the undue accenſion of the Blood in the Heart,or rather to the preternatural affection of the Nerves,ſerving for reſpiration: By the like reaſon alſo the cauſe of more difficult inſpiration or taking in the Breath, is deduced from the ſame fountain, *viz.* in either caſe the Nerves ſerving for the drawing in and thruſting out the Breath, for that they are poſſeſſed with a morbifick matter,and that either Narcotick or Spaſmodick,they perform in the executing their proper Offices either more or leſs than they need to do. But ſometimes ſcorbutick Perſons are troubled with a ſtraitneſs of Breaſt, without the breathing much hindred;ſo that they feel the compaſs of the *Thorax* to be more ſtrictly drawn together,and to be contracted into a narrower ſpace: In the mean time, thoſe ſo affected complain rather of the anxiety of the heart, than of any hindrance of the motion of the Lungs: The cauſe of this ſeems to be,that the Membranes inveſting the *Præcordia*;for as much as being too much irrigated with a ſerous humour,together with the nervous,. become more contracted like wet Leather: So that their Fibres being irritated,wrinkle themſelves too much into ſhort Convulſions or Spaſms,and from thence they force the containing parts to be ſtraitned: Beſides,this kind of ſtraitning of the *Præcordia*,follows in ſome part the motion of the Heart it ſelf: For whilſt the Blood is made poorer, it does not leap forth ſtrongly enough from the boſom of the Heart,nor flames out openly into the Lungs. Wherefore theſe need the leſs to be dilated or expanded, but rather that they may anſwer to the circulation of the Blood, performed in a leſſer compaſs,and exactly quadrate to the inveſting Membranes,& to the nervous Fibres deſtinated to their motion they are regulated

ted according to the weak limits of expansions: Wherefore this constriction of the *Præcordia*, as I have observed in very many, is wont to be suddenly remitted and intended, by reason of the occasions of Joy and Sadness, even as the Blood leaps out more plentifully, or more sparingly from the bosom of the Heart, the greater or the lesser space is proportionated to its Circulation.

Inordinate Pulse.

4. An unequal and an intermitting Pulse, also frequent swoonings and fear of the same, very often happen in the more grievous Scurvy, the same reason of which as of unequal breathing, is ascribed deservedly, now to the undue accension of the blood in the Heart, and now to the inordination of the nervous stock. The Blood being made more saltish, and besides much stuffed with scorbutick feculencies, is but unequally and brokenly inkindled, like the oyl of a Lamp imbued with Salt and muddy filths: Wherefore from hence an irregular Pulse, with a wasting of the vital spirits in the Brain is stirred up. Moreover, when the cardiack Nerves are also beset round with a morbifick matter, so that the influx of the animal Spirits, by which the motion of the heart is continued, is not performed in a just dimension and equal manner, by that means it happens that the motion of the heart is somewhat hindred, and its reciprocations variously disturbed; an inequal or intermitting Pulse, and a small & weak seems to proceed from the dyscrasie of the Blood, but if it be great and strong enough, from the fault of the animal function.

The Passions of the heart.

5. The trembling palpitation and great leapings of the heart often happen to those scorbutically affected; these sort of passions are merely convulsive, and altogether depend on the cardiack Nerves, to wit, belonging to the heart it self or *Pericardium*, beset with a spasmodick and explosive matter: For the animal Spirits, the inmates of the Nerves themselves and of the Fibres, and their appendices being inordinately explosive, compel the whole joynting of the heart to be cruelly shaken and moved. In the mean time, whilst the whole bulk of the heart is agitated by that means, it does often rightly perform the proper motions of *Systole* & *Diastole*, as I have observed in many, who with such a shaking of the heart have had an ordinary and laudable Pulse.

Wandring Fevers.

6. Erratick Fevers, also sudden suffusions of heat & cold in several parts of the Body, use to come upon an inveterate Scurvy: The reason of the former is, because the extraneous matter being often carried to the Blood with the nutritious Juice, for that also the alible Juice it self is made degenerous, because it is not rightly mixed with the Blood, they stir up its extemporany effervescencies. In the mean time, a Fever observing a regular type, for that cause excited, rarely happens to Scorbuticks, because the salsuginous Blood, although it be taken with a feaverish burning, does not burn long nor much, at least not equally: As to the sudden suffusions of heat and cold, they indeed seem to be inferred somewhat by reason of the affection of the nervous stock; for that the Nerves and Branches and nervous succours, do diversly embrace & compass about the sanguiferous Vessels in most parts of the Body, perhaps for that use, that the course of the Blood might be urged & restrained, as it were with Goads and Bridles, according to the force of the passions, and other exigencies of Nature: it is very likely that when the œconomy of the animal Kingdom is perverted by the scorbutick taint, that most of the Nerves and Fibres and their Appendices, being stretched out here and there; do every where run into spasms or convulsive motions, and also by reason of their hurt, the irregularity of the Arteries and Veins are contracted: So that the Blood is compelled into these parts more than it ought, and is too much estranged from them, from whence these kind of inordinations of heat and cold proceed.

Nightly Sweats

7. Plentiful Sweats chiefly at night, are wont to be very troublesome to some scorbuticks, the reason of which is, that as the nutritious Juice being daily brought into the mass of Blood, by reason of the dyscrasie or evil disposition of this, and the impurity and filth of that, is not assimilated; but being rejected of the Blood is sent away under the form of Sweat. But that the nutritious Juice in the time of its assimilating, becoming degenerate; does not produce an intermitting Fever after its manner, the cause is the saluginous intemperature of the Blood, which therefore becomes less able for periodick deflagrations; this sort of immoderate sweating happens chiefly in the Scurvy, following upon a long Fever or other Chronical Dyscrasies, where the nutritious Liquor is perverted, rather by the default of the assimilating Blood, than of the concocting *Viscera*.

Lixivial urine.

8. In a more certain Scurvy, as in other Diseases, we consult the Urinal: For if the Urine appears intensly red, and as it were lixivial without a Feaver or the Jaundise, we undoubtedly pronounce this a sign of that Disease: For whilst the serous *Latex* is circulated for some time with the soluted Salt, and Sulphur, the saline and sulphureous Particles being inconcocted in the same, bestow on it a very deep and as it were lixivial tincture: Also that such Urine abounds very much with contents, which, the stale being cold, precipitate to the bottom, it altogether owes it to the Particles of the degenerate nutritious Juice snatched away with the *Serum*. But yet the Urines of the scorbutick persons often

vary,

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vary, for ſometimes they appear of a Citron colour, with a Cream ſwimming in it or fixed to the ſides of the Glaſs, from whence an *indicium* is taken, that the Blood doth abound with ſaline rather than ſulphureous Particles: Indeed if ſuch an Urine be exhaled at the fire, the ſaline reſidence will remain in almoſt the double quantity of the Liquor. Moreover, ſometimes the Urines of the Sick are changed from this or that ſtate to the contrary, ſo that what was to day red or of a Citron colour, to morrow is made limpid, clear, and thin, and in abundance: Which kind of Piſs, as it appears, was not circulated long with the Blood (becauſe it hath received no tincture from it) we judge to come to paſs from the watry recrements of the Blood and nervous juice, contained partly within the Lymphæducts, and partly depoſited within the Pores and paſſages of the ſolid parts, which when they are gathered together to a fulneſs, every where run forth of their Receptacles with the riſing flood, and ruſhing into the bloody Maſs, are from thence ſent away preſently by the Reins.

A plentiful ſpitting and ulcerous Affections of the Mouth.

9. There follows upon this Diſeaſe being grown very grievous, a plentiful ſpitting, and for the moſt part a bloodineſs of the Gums, and then a looſeneſs of them, and at length a putrefaction, which is wont to be accompanied with an Eroſion, Looſeneſs, or falling out of the Teeth, and with a ſtinking Breath: That the reaſon of which may the better appear, in the firſt place, you are to be advertiſed, that there are ordained about the peculiar parts of the mouth, certain Pipes or paſſages, to wit, ſalival, by which the ſerous humours are plentifully ſent forth: Theſe ariſing from various Glandula's, to wit, the *Parotides* being in the Weſand or Throat, the Maxillar for thoſe belonging to the Jaws, and thoſe under the Tongue for the moſt part terminate about the Gums or near them: The conſtant and ordinary Office of theſe, is to lay up the Spittle for ſome neceſſary uſes in the Cavity of the mouth. Beſides, it is obſerved that the ſuperfluous humours, yea the more thick and vicious are perhaps ſent away forth adoors by this way, rather than ſeparated from the Blood as by Urine, Sweat, and otherways. Quickſilver prepared with Salts and taken inwardly, or the Body anointed with it, is minutely diſſolved by the ſaline Particles of our Body, and being with them involved, mixes it ſelf moſt deeply: Theſe kind of Concretions of Salts and Mercury, being diffuſed thorow all the humours, and into all the parts of the whole Body, as Nature endeavours to expel the trouble they afford; the beſt indeed and moſt eaſily performs their execution by theſe emunctories of the Mouth: For the Blood, and perhaps in ſome part the nervous Liquor being burthened with thoſe mercurial-ſaline Recrements, endeavour by every way to ſhake them off, which however, when they are more thick and fixed, than that they can be exhaled or diſtilled forth by ſweat, or ſent away, being precipitated by the ferment of the Reins through the Urine; they are ſometimes breaking thorow the little mouths of the Arteries, inſerted in the Inteſtines, in ſome part excluded by the Belly: But yet the particles of this Medicine being involved with the *Serum*, and moſt readily depoſited in the aforeſaid Glandula's, and in others belonging to the Mouth and Throat, flow out by ſalivation more plentifully excited; by which effluxion it happens that the Gums and other parts of the Mouth are ulcerated, and the Teeth are looſened with a ſtinking of the Mouth. But this kind of ſalivation ſometimes ſucceeds of its own accord, inſtead of a *Criſis* without *Mercury*, in the declination of ill judged Fevers, and the humour to be excerned, ſweating forth not only from the more open holes of the ſalival paſſages, but alſo from the little mouths of the Arteries every where thick planted, daub over the Cavity of the Mouth with a whitiſh ſcurf. The like reaſon of theſe accidents, may be rendred of theſe ſort of Symptoms in the Scurvy: For indeed when in a depraved Blood, more and thicker recrements of the enormous Salt and Sulphur are gathered together than can be excerned by evaporation or by Urine or Siege, they are carried to the emunctories of the Mouth; by which the more ſalt purgaments of the Blood are wont to go forth: theſe ſalt things being diluted with the *Serum*, ſweating not only from the ſalival Veſſels, create great ſpitting; but alſo being carried thorow the Arteries, enter into the ſoft and ſpungy fleſh of the Gums which firſt of all, their pores being filled with an ichorous Blood, ſwell up; but afterwards the ſalt Ichor going forth from the Blood, and being continually excreted, the fleſh of the Gums, by reaſon of the defect of laudable nutriment, grows flaggy, leaving the Teeth almoſt naked. Further, by a long afflux of matter plainly corroſive, the fleſh of the Gums is eaten away; ſo that the Teeth can hardly ſtand, but grow looſe or fall out of the corrupted Stalls: And by reaſon of the ſaline-ſulphureous Particles, partly of the excreted humour, and partly of the putrefying Gums, being continually breathed forth, the filthy ſtinking ſmell of the mouth is excited.

Various Spots and whelks.

10. Spots breaking forth in the Thighs and in other parts of the Body, are accounted a pathognomick ſign of the Scurvy: Theſe are ſometimes about the bigneſs of a Penny, and often as big as a Shilling, ſometimes the Skin ſeems to be marked or ſpotted an hands breadth or more in ſome part: Beſides, theſe Spots are of divers colours, to wit, now-

Citron

Citron Colour, now Dark, now Purple, and ſometimes appear livid, blewiſh or black: Beſides, ſome have whelks variouſly ſwelling, *viz.* now lightly, now with a hard, and as it were a cruſty skin, or they break out with ſcales here and there in all the membrs of the Body: Among the ſpots and breakings forth whether tumid, or equal, or rough, this difference is noted in general, *viz.* that theſe contain a matter not congruous with the Blood, wherefore being ſecreted from its Maſs in its circuit, they are fixed in the Skin; neither are they altogether forſaken by the Blood, but that the Blood paſſing by adds to them others & new Particles, whereby it comes to paſs that the extravaſated matter, by the continual approach of the Blood, is either at length ſupp'd back again, or being ſubtiliſed is breathed forth, (and ſometimes it is effected partly one way and partly the other) or laſtly that matter being ripened, runs into an Ulcer or Sore. Moreover, Whelks almoſt of every kind do generally happen not only in the Scurvy, but in many other Diſeaſes, yea if at any time the Blood does immoderately boyl up through any occaſions. But ſpots are portions ſecreted from the Blood, and every where forſaken by it; ſo that there is nothing of commerce between them & the circulated Blood, wherefore they increaſe not in bulk, nor ſuppurate, nor eaſily evaporate. The Citron or darkiſh Spots ſeem to be ſome portions of Choler or Melancholly, poured forth from the Blood into the Skin: But as to the black or Purple marks, it is to be known, that they are not excited in any other diſeaſes, beſides peſtilential Fevers, the venereal diſeaſe, and the Scurvy: In the Plague and malignant Fevers they ſeem to be certain rejected parts of the blaſted and deadly affected Blood, to which always a Malignity and Contagion are joyned, as we have elſe where ſhown more at large: In the Pox and Scurvy, though there is not ſo much malignity found, that the Spirits of the Blood are greatly mortified, or that its liquor becomes ſo greatly blaſted, yet we may well ſuſpect, that in either diſeaſe, growing grievous, the Blood being apt to be in ſome meaſure broken and coagulated, it grows together into leſſer Clotters; which ſort of Concretions of the Blood being extruded at the mouths of the Arteries, are fixed in the Skin, and according as theſe portions are greater or leſſer, and participate more or leſs of the corrupted Blood, the Spots alſo, as to their bigneſs, and colour, are fixed in the Skin.

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The Flux of the Belly.

11. A Flux and looſneſs of the Belly happens frequent enough in the Scurvy, ſo that the *Faeces* of the Belly, which are ſometimes liquid and ſometimes compacted, and of divers Colours, ſeem to exceed in quantity the aliment that is taken in, which ſort of Flux, although it appear immoderate if it be ſtayed by the uſe of Medicines, preſently the Sick are wont to find a ſwelling of the Ventricle and *Hypochondria*, a hardneſs of Breath, or a waſting of the Spirits. The cauſe of the ſcorbutick *Diarrhœa*, is partly, that the Chyle is not rightly cook'd, neither is it ſoon enough, or ſufficiently born through the milky Veſſels; hence ſtagnating in the Inteſtines and becoming degenerous, is caſt forth adoors, but this chiefly happens, for that the impurities admitted within, from the bloody Maſs, drop out from the little mouths of the Arteries, wherefore the things excreted are more copious ſometimes than thoſe put in.

Vomiting, nauſeouſneſs, &c.

12. By the like reaſon, Scorbutick and Hypocondriack perſons are found obnoxious to frequent Vomiting, nauſeous Belching, and heart pains; which Symptoms indeed do frequently happen in this Diſeaſe, partly becauſe the Tone of the Stomach is looſned, and its Ferment vitiated, whereby it comes to paſs, that the reliques of the Chyle evilly concocted, is turned into an auſtere Salt, Vitriolick, or otherways degenerate pulp, and beſides, though the Stomach be ill, becauſe the recrements of the Blood reſtagnating within, are poured into its Boſom.

Dyſenterie and Hæmorrhagies.

13 Sometimes a dyſenterick Affection, alſo frequent hæmorrhages or flowings of Blood at the Noſe, the Fundament, Reins, *Thorax*, Gums and other places, follow thoſe ſick of an inveterate Scurvy: The cauſe of which Symptomes is, for that the Blood being made more ſalt, and therefore more apt to grow hot, eaſily breaks forth at the mouths of the Veſſels; but chiefly, becauſe when the tone of the ſolid parts is weakned, and that the Fibres are made very lax, the mouths of the Veſſels become broader and diſcontinued, ſo that it does not rightly lead the paſſages from the extremities of the Arteries into the little mouths of the Veins, but that the Blood being intercepted between the openings of the Veſſels, and being there apt to ſtagnate and flow out, by what it can, it eaſily breaks forth, and ſlides it ſelf forth adoors.

Theſe are the chief Symptoms, which are wont to be inferred by the Scurvy, by reaſon of its taint; being impreſſed on the maſs of Blood, and from thence tranſlated immediately into other parts, ſome of which alſo happen to be cauſed, partly by the depravation of the nervous Liquor. Now we will next conſider of the Effects and Accidents of this Diſeaſe, which are wont to be excited, almoſt only or chiefly by the fault of the nervous Juice.

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CHAP. IV.

The Symptoms and Accidents which are wont to ariſe in the Scurvy, by reaſon of the Taint impreſſed on the Brain and nervous Stock.

Fearfulneſs and languor of the whole Body.

1. WE have already intimated, that in the more grievous Scurvy, the moiſtning Liquor of the Brain and nervous appendix is wont to become thinner and poorer, whereby it comes to paſs that moſt of the animal Functions are performed untowardly and ſlowly, hence, the locomotive power flaggs very much, ſo that the ſick loving Idleneſs and eaſe, ſhun exerciſes and labors of the Body, go about unwillingly any Task, and preſently being weary give it off. I have known in ſome the whole ſenſitive Soul to ſeem leſſened, and as it were made unequel for the Body, ſo that the ſick, believing themſelves not able to walk, nor ſtand; have refuſed altogether to be raiſed, or to riſe from their Beds; when as yet no evident cauſe did hinder, but that they were ſtrong enough to do what was required: Beſides ſuch, however ingenious they were before, abhorred the Studies, and labours of the Mind, and plainly affected to wear out their Life by doing nothing.

Melancholly.

2. In an inveterate Scurvy the nervous Juice declines from a ſpirituous-ſaline diſpoſition towards a ſour one; hence, as we have elſewhere ſhown, Melancholly, a fluctuation of the mind, an often mutation, and inconſtancy of purpoſes, proceed: moreover, as the nervous Fibres are perpetually watered by the influx of ſuch an humor, from hence, in ſome part, come the more light Spaſms or Twiches, cramp-like contractures, and wandring Pains. But indeed the chiefeſt vice of the nervous liquor, is wont to be, that being ſtuffed with filths and fæculencies, it contains heterogeneous particles, and divers ways hurtful to the animal regiment: wherefore happen very often to Scorbuticks horrid and grievous Affections, of which ſort, are the following Symptoms.

Scorbutick Palſie.

3. Paralytick Affections, *viz.* Impotency, or the reſolution of one or more of the Members, alſo ſtupor, or lack of feeling, and a ſenſe of tingling, or pricking, often follow upon a deep and heavy Scurvy: which ſort of Symptoms are not however, for the moſt part, very much fixed and permanent, but ſometimes they ceaſe or remit, and anon are repeated or increaſed. The ſcorbutick Palſie is wont to be excited chiefly from three

From 3 ſorts of Cauſes.

ſorts of cauſes, which now conjunctly now diviſively produce this Diſeaſe. 1. For the Debility, or reſolution of the Members, happens, becauſe of the nervous Juice being departed, there wants a ſufficient plenty or ſtock of the animal Spirits, whereby all the members ſhould be actuated: Hence, the ſick have the locomotive faculty flagging, or weak, as if infeebled by old age, about the thighs, and feet, and ſometimes in other extream parts, to which the influx of the Spirit doth not plentifully reach: perhaps afterwards, as greater afflux of the Spirits is carried to the affected Member, and is in the mean time elſewhere deficient, the diſeaſe ceaſes, or is transferred to another place. 2. Sometimes the animal Spirits, although they are plentifully and ſufficient enough, in the parts, yet they are infected with Heterogeneous, and as it were narcotick particles, brought along with the nervous Juice, ſo that being as it were bound, & almoſt overwhelmed, they are not able ſufficiently & nimbly enough, to perform their exploſive endeavours, or labors: hence ariſe not only the impotency of the motive faculty, but alſo a certain depravation of the ſenſitive, *viz.* a benummedneſs, and a ſence of ſtinging, tingling or pricking, for that whilſt the animal Spirits are loaded with an incongruous *Copula*, their irradiation, like the beams of the Sun, paſſing thorow a cloudy air, is performed, but refractedly, and diſturbedly. 3. Although the animal Spirits are diſpenſed in a ſufficient plenty, and are free and clear of any narcotick quality, yet oftentimes their paſſages are obſtructed, ſo that the Commerce between the inflowing Spirits and thoſe implanted within ſome members, cannot be performed conveniently; for it ſometimes happens, that the more thick and earthy Particles do enter into the bodies of the Nerves with the moiſtning Juice; which ſo ſtuff the paſſages, about the enfoldings of the Nerves and other nervous windings, with their full burthen, that the irradiation of the Spirits in this or that member is wholly hindred. So I have known ſome, who have had a hand or foot wholly enfeebled or reſolved, whilſt the arm, or thigh, with the reſt of the Body was well.

4. From

Pains of which there are several Species.

4. From the like cauſe, *viz.* ſcorbutick Fæculencies, fallen upon the Bodies of the Nerves, Griefs or Pains alſo, which are eſteemed the moſt frequent Symptomes of this Diſeaſe, do in ſome ſort proceed; But as they are of a divers kind, they alſo ariſe ſometimes from other Cauſes. For indeed, the ſcorbutick Pains are either more light, uncertain, and quickly paſſing away, which depend ſometimes upon a *Flatus*, or Wind diſtending the Membranes, and ſometimes on a ſharp or Salt matter, poured forth, now from the Blood, now from the nervous Juice, upon the nervous parts; which kind of matter, for that it is improportionate to the nervous Fibres, pulls or hawls them, and irritates them into corrugations or wrinklings and becomes painful: but, for as much as the ſame is quickly waſhed off by the flowing of the *Serum*, or diſſipated by heat, the troubleſom ſenſe brought in from ſuch a cauſe is more eaſily removed. Or in the ſecond place, the ſcorbutick Dolors, are more grievous, very acute and hard to be moved, which ſort alſo, are either fixed, or determinated to ſome particular place, or wandring transfer the Pain, and that moſt grievous, from one place to another, as may be perceived in a wandring and Scorbutick Gout, and Rheumatiſm, concerning which we ſhall diſcourſe hereafter: In the mean time, fixed Pains and a long time remaining, are wont to be excited in divers parts, but chiefly in the Belly, Loyns, Thighs, *Sternum* or Cheſt, and in the Head: It will be worth our labour, briefly to deſcribe the Pathologie belonging to every one of theſe places.

1. An Almoſt continual Pain of the Belly.

1. The pain of the belly is ſo familiar to the Scurvy, that according to the German *Idiom*, it ſhould take from thence its name. This Symptom, though in a lighter degree, almoſt continually afflicts ſome ſick perſons, to which is joyned now a looſneſs, and now a high binding up of the Belly: the reaſon of which ſeems to be, for that, when both the Blood and nervous Juice abound with impurities, both the Arteries and Nerves carry the plenty of excrementitious matter towards the ſink of the Belly, which being fixed about the Coats of the Meſentery, or the Inteſtines, ſtirr up conſtant Pains, by a perpetual pulling the nervous Fibres. But beſides there happen to ſome ſcorbutical perſons, Paroxyſms or fits of very acute Pains, as it were Colical, Affections which being protracted for many dayes, yea ſometimes weeks, miſerably torment the ſick: ſo that they think their Bowels to be pulled, and torn to pieces with the grievouſneſs of the Pain: theſe pains are wont hardly to be allaied with any remedies, unleſs with the more generous Opiates; and as ſoon as the virtue of the Hypnoticks is conſumed, they are repeated with their wonted Cruelty, but continuing with a longer fit, very often torments in the Loins and Back are propagated and at length are diffuſed on the members of the whole Body: to this ſort of affection a Palſie does not ſeldom ſucceed. But then in reſpect of the Cauſe of the Scorbutick Colick, it is not probable that it ſhould ariſe from a ſharp matter, depoſited within the Cavities of the Inteſtines, neither from any ſimple humor, however miſchievous it be impacted in their Coats: for this is quickly ſhaken off, or goes into an Ulcer, beſides that is eaſily exterminated by the uſe of Clyſters, or Purges: but indeed, theſe cruel torments of the Belly can come from no other cauſe, than the mutual ſtrivings and effervеſcencies of the Salts (which are of a divers Nature) fighting or ſtrugling together, whereby truly the Nervous Fibres are pulled, and as it were torn aſunder. For we may ſuppoſe, that certain ſour recrements of the nervous Juice, like to vitriolick *Stagmas*, being gathered together about the foldings of the Meſenterie, or other nervous parts of that region, to which comes a ſerous *Colluvies* from the arterious Blood growing hot, abundantly ſtuffed with the particles of a fixed, and as it were a lixivial Salt, and with thoſe ſwellings up produces as it were piercing Pains. From thence it may be argued that the mine of the former morbid Stock deſcends from the Head, by the paſſage of the Nerves, into the lower Belly, for that great headaches, alſo the Vertigo and Swimming, or turning round in the Head often præceed, and not rarely ſucceed this kind of Colick. Beſides, it appears that from the Bloody Maſs there is a large ſupply ſent of particles of fixed Salt, paſſing as it were by *Deliquium* or a ſtraining thorow; becauſe the fitt of this Diſeaſe being very urgent, the Urine of the ſick appears of a deep colour, and is very much ſtuffed with Salt, and as it were lixivial, and oftentimes its ſuperficies is variegated with divers Colours, like the train of a Peacock: But ſo ſoon as the Diſeaſe begins to decline, the Urine is better, and from hence they are wont to aſſume hope and ſigns of growing well. But that this affection of the Belly is often propagated into the Loins, the reaſon is becauſe the nerves of the Loyns and the meſenterery intimately communicate, and in very many places are mutually inoculated: wherefore when the dolorifick matter ſuperabounds in the paſſages of theſe, it eaſily paſſes into the neighbour proceſſes of thoſe: But then that the Diſeaſe encreaſing, the pains being diffuſed thorow the whole Body, almoſt every Joynt and Member are afflicted, the reaſon is, becauſe when a more plentiful proviſion of the morbid ſeed is begot-

2. Pains as it were of the Colick.

The cauſe of them.

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ten in the head, then can be derived to the whole ſtock of the firſt affected Nerves, *viz.* the moving and intercoſtal pair; part of it entering into the Bodies of the other Nerves, and alſo ſpinal Marrow, ſpread, abroad this morbifick mine, participating of acetous Salt into very many parts of the whole Body, which every where by the acceſſion of the fixed Salt, from the bloody Maſs becomes dolorifick: and laſtly, after that the plenty of Spirits is profligated by the incongruous matter, the reſidue after the mutual effervescencies of the Humours, being in very many of the Nerves together beſet, and mightily filled or ſtopped up, the waies of Emanation are obſtructed, and their mutual commerce is broken off, ſo that 'tis no wonder if thoſe long Pains end at laſt in a Palſie, not only in the middle of the Belly, where the morbifick cauſe ſeems to ſubſiſt, about the foldings of the Meſenterie, but in other places round about, Pains not inferior to the Colick, are wont to ariſe. I know a noble Maid that was obnoxious to moſt cruel Torments, near the *os Pubis*, during about the ſpace of a Month, and were wont to be repeated upon any occaſion, given without any ſuſpition of the Stone, or Ulcer in the urinary Paſſages: which kind of affection I judge to depend upon a morbid matter impacted in the nervous foldings, planted in the *Hypogaſtrium*. Further, it is familiar to ſcorbutical Perſons, to find fits of very cruel Pains, ſometimes in the right, ſometimes in the left *Hypochondria*, and ſometimes about the Region of the Ventricle: the cauſes of which we think to ly hid in the nervous foldings, belonging to the *Viſcera* planted in that place.

Pains in ſeveral parts of the Abdomen.

In the Loins and Back.

2. Scorbutick Pains, are wont ſometimes to infeſt the Loins, and alſo the Region of the Back, now above, now below, without any prævious Affection of the *Abdomen*, or of the Reins. I have known ſeveral keeping their Beds with ſuch a Diſtemper, perpetually crying out Day and Night, by reaſon of the intollerable torment: The cauſe of this kind of Paſſion may be aſcribed to the acetous Recrements of the nervous Juice poured on the Membranes, and Tendons of thoſe parts, and ſo ſtirred up into effervescency by the acceſſion of the Sanguinious ſaltiſhneſs.

In the Breaſt and Pleura.

3. By reaſon of the ſame conjoyning of Salts, affixed on the Membranes, Cloathing the *Præcordia* very troubleſom Pains about the region of the Breaſt, and not eaſily to be removed, are often induced; hence the Baſtard pleuriſie is ſo frequent a ſymptom of the Scurvy. I have known many ſcorbutical perſons very much troubled for a long while, with a moſt grievous Pain under the *Sternum*, ſo that in ſeveral ſo affected, I could not but think there was ſome Ulcer, abſceſs lying hid in the *Mediaſtinum*; when in truth this ſymptom did depend only upon the heterogeneous matter, brought thither, partly by the Nerves, and partly by the arteries, and there growing hot, being affixed to the Membranes; as the event often proved: for that the ſick were freed, by the long uſe of antiſcorbutick Remedies.

In the Head.

4. Hitherto we have recounted the chief kinds of Pains, infeſting the middle parts of the Body. But in the Scurvy there is felt thoſe no leſs troubleſom, in the extream parts, *viz.* the Head, Thighs and Leggs. As to the firſt, Headach is ſo rarely wanting to this Diſeaſe, that many by this effect are ſatisfied, chiefly that it is the ſcorbutick Venom; by which they become obnoxious to moſt grievous fits of this evil, and handled for a long time, and oftentimes repeated. The cauſe of this is obvious to every one, that it may be aſcribed to the humours poured on the *Meninx* or Films inwrapping the Brain, which alſo Anatomie hath proved. For the Skulls of ſome of the dead being opened, I perceived both the membranes grown together, and every where ſet thick with little Whelks, and ſcirrhous tumors, which kind of tumors and concretions, ſeem to have riſen from the mutual coagulations of the two-fold painful humour, after many effervescences.

In the Thighs.

5 Nor indeed is it any otherwiſe to be determined, as to the Pains moſt grievouſly afflicting the Thighs and Leggs of the ſick, chiefly in the night time: for many labouring with an inveterate Scurvy as ſoon as ever they are warm in their beds, are wont to endure intollerable torments, about the calves of the Leggs, Shins and Thighs and ſometimes about other parts, ſo that they cry out their fleſh is gnawn, or torn in pieces like the biting of Dogs: Theſe tortures if they leave their Bed, do ſomewhat abate; otherwiſe the afflicted are moſt miſerably tormented all Night long: In this caſe there can nothing be more aptly conceived, than the acetous recrements of the nervous Juice, to fall down on the Leggs, as into a place having a great declivity and to be copiouſly affixed to their Membranes, to which whilſt the rejected Salts do come from the Blood notably rarefied and agitated, thorough the heat of the Bed, & do ferment with theſe after the manner of Salts, therefore indeed from the mutual ſtriving and effervescency of the Particles of divers kinds, the nervous Fibres being pulled and hawled beyond meaſure, run into painful Corrugations, neither do indeed theſe dolorifick Pains ceaſe or remit, till the particles are gathered together, either evapo-

rate

rate or by their mutual wreſtling being brought under are worn out, are quiet from their effervescencie; but then within a little ſpace, freſh proviſion of either matter diſpoſes to a new paroxyſm, by reaſon of the mutual effervescencie, and coalition. Of theſe kind of Salts of a diverſe kind, proceeding from a twofold humour, the wandring Gout, the Rheumatiſm and certain other affections are produced, which we deſervedly impute to the conjunct dyſcraſies, and as it were evil confederations of the Blood and nervous Juice. Moreover in the ſame Claſs certain ſpecies of ſcorbutick Pains but now handled, ought to be placed; but becauſe they are of kin to other Pain, ariſing from the Sole Vice of the nervous Juice, or of the Blood, therefore we have here joyned together the divers Theories of the dolorifick Affections.

As there is a conflux of Symptoms of a divers kind in the Scurvy, ſo there is begotten a manifold morbifick matter, and of a divers nature: *viz.* Heterogeneous particles coming into the Brain and nervous ſtock, with the moiſtning Juice, are ſometimes narcotick, bringing forth the Palſie, and ſometimes ſaline, cauſing Pains, (as we have ſaid) alſo ſometimes they are nitro-ſulphureous and exploſive, from which the ſpaſmodie or cramp-like affections ariſe: but by reaſon of particles of this ſort go together in the Brain, there happen to ſcorbutical perſons, Vertigos, ſwimmings in the head and outragious aſſaults, like the falling ſickneſs: From the like cauſe, poſſeſſing the nervous Stock, proceed convulſive motions, trembling, ſhakings and very often horrid contractions in the *Viſcera* and in the Members. We have already ſpoken largely enough of the nature, differences and cauſes of Convulſions. Beſides we have fully deſcribed certain admirable caſes of this affection, ariſing from the ſcorbutick infection, ſo that it ſeems needleſs to diſcourſe any more of this matter, for it may be eaſily accommodated by the hypotheſis before delivered, to all the ſpaſmodick ſymtoms of the Scurvy whatſoever.

The Vertigo.

6. Thoſe labouring with an inveterate Scurvy are very obnoxious to a Vertigo: Concerning this affection, and alſo of many other Cephalical, we have made ſpecial diſquiſitions, which may perhaps be ſometimes made publick. In the mean time we will in one word ſignifie that this Symptom ariſes, for that the animal ſpirits are in ſome meaſure perverted from the wonted ways of their expanſions, to wit, being either hindred on otherways driven from their ſeries, ſtate, and orders are compelled to break off: this happens to come to paſs as in other caſes, ſo chiefly in the Scurvie eſpecially for two cauſes, either for the one, or the other, or for both together; *viz.* either becauſe the commerce of the Spirits is obſtructed ſomewhere, in ſome paſſages and Pores of the brain, being poſſeſſed by ſome extraneous gueſt, or ſecondly, ſome companies of the Spirits, being burthened with an heterogeneous *Copula*, or joynting are compelled to ſtay behind the reſt, or to go out of their tracts: In this Diſeaſe the liquor indeed inſtilled to the brain from a very impure blood, brings with it very many Fæculencies, by which it can be no otherways, but that the heterogeneous particles ſhould every where ſtuff up the Pores of the Brain, and growing to the animal Spirits, oppoſe them or force them into exploſions.

Sleepineſs.

7. Almoſt for the like cauſe, ſleepineſs and torpor, or heavineſs frequently happens to Scorbutick, perſons, *viz.* for as much as the animal Spirits being burthened with watery or narcotick Particles, and very much oppreſſed, cannot perform readily their expeditious and quick motions within the Brain very much alſo obſtructed, neither continue long the acts and exerciſes of their functions, but love to ly down and to indulge themſelves with idleneſs and reſt. Moreover, this ſort of affection ſometimes is ſtirred up by the defect and want of the animal Spirits; for from the Blood very much vitiated and as it were dead, the Brain and nervous Stock is ſupplied but with a thin Liquor, and almoſt lacking of all *Vigor*: From ſuch a *Prophaſis* or occaſion, I have known a Lethargie excited in thoſe about to dy; by which the affected though they ſeemed to indulge themſelves with a continual ſleep, yet being called are wont to know thoſe ſtanding about them, and to anſwer thoſe who ſpeak to them; but the ſtore of the animal Spirits growing weary, they were neither able to wake long nor to attend to diſcourſe. When I have opened ſuch who were overwhelmed with perpetual ſleep, I have found the Brain dry enough and altogether free from a Dropſie, or ſerous *Colluvies*, with which lethargick perſons are wont for the moſt part to be affected.

And waking.

But ſometimes on the contrary, ſome ſcorbutick perſons are moleſted with almoſt continual waking. Which kind of Symptom proceeds ſometimes from the affections of the mind, Grief, convulſive Paſſions, fear of Swooning, paſſions of the Heart, and alſo from the perturbations of the Stomach and of other *Viſcera*; for as much as the Spirits being vehemently moved in every part of the ſenſitive Soul, their whole Hypoſtaſis is detained from entering into reſt, or a tranquil condition. For I have known ſome touched with a ſcorbutical Taint, who though they were free from Pains

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or Spaſms, and alſo clear from any immoderate affection of the mind, have been induced to watchings day and night for many weeks, and oftentimes could get no ſleep, though they had taken ſtrong opiates: In the mean time they continued lively enough and ready to the performance of Labours, without any heavineſs of the Head, and without any torpor or ſluggiſhneſs of the mind or ſenſes, as if they had wanted no ſleep. The reaſon of this ſeems to be, that ſometimes together with the nervous Juice, certain nitro-ſaline Particles of a fierce and unquiet nature, (of which ſort are the Effluvia's falling from *Aqua fortis*, or the ſpirit of nitre) growing to the Spirits, compell them to be perpetually agitated and to be continually in motion: for even as Vapors breathing forth from ſtygian Waters, are never altogether fixed or at reſt, ſo the heterogeneous Particles which are of that ſort of Nature, adhering to the Spirits inhabiting the Brain, ſuffer them ſcarce ever to be idle or to indulge ſleep. Theſe are the chief ſymptoms that are wont to be ſtirred up in the animal regimen, by reaſon of the ſcorbutick taint being impreſſed on the moiſtning liquor of the Brain, and Nerves; which with thoſe before mentioned happen by fault of the Blood, degenerating from its right *Craſis*. But as to thoſe great & Herculian Diſeaſes, to wit, the aſſaults of the Apoplexie and the Epilepſie, which ſometimes happen to ſcorbutical Perſons: In theſe caſes the former affection, being as it were married to another more worthy, loſes its name, and paſſes into the Pathology of that, as it were into its Progeny; laſtly we will inquire what are the ſymptoms of the Scurvy by reaſon of the conjunct Dyſcraſis of the Blood and nervous Juice, as it were joyning their alliances in Evil.

CHAP. V.

Of the ſymptomes of the Scurvy which ariſe by reaſon of the Conjunct Dyſcraſies of the Blood and nervous Juice.

IN this rank, in the firſt place is ſet the ſcorbutick Atrophy or conſumption of the Fleſh: for who labour long with this Diſeaſe often fall into a *Maraſmus* without any ſignal fault of the Lungs, or ſuſpition of a Conſumption or *Phthiſis*, ſo that the Fleſh wholly falls away, and the Skin becoming very flaggy, ſcarce ſticks on the Bones. The cauſe of which ought not only to be attributed to the fault of the Blood degenerating from its right *Craſis* or diſpoſition; for this however depraved it be, for the moſt part aſſimilates ſome portion of the nutricious Juice, and beſtows it on the parts to be nouriſhed: but indeed when as the nervous Juice is alſo bad, the nutritive faculty is altogether inhibited; for that by the defect or fault of this, the nutriment elaborated by the Blood becomes altogether unprofitable and unfruitful: By what means, as to nutrition, either Liquor, to wit, the Sanguinious and nervous diſcharge themſelves, we have elſewhere ſhewn. From that hypotheſis, which ſeems to be built upon ſufficiently probable reaſons, it eaſily follows that the Atrophie, familiar to the Scurvy depends from the conjunct irregularities of either nutritive faculty. For as much as the Blood gives only vicious aliment, and that the nervous Liquor fails in the actuating & aſſimilating it, there is a neceſſity for the ſolid parts, being continually defrauded of their food, to wither away.

2. The ſcorbutick Gout, which is very much wandring, and affects now this Part now that ſucceſſively, now more parts together, aud leaps about from one place to another, or from theſe places to thoſe, ſeems to depend upon a double Stock, even as the Colick above deſcribed, but the manner altogether inverted. For indeed it is to be ſuppoſed in this Diſeaſe, that very many heaps of the fixed Salt, from the bloody Maſs are diſpoſed here and there about the Members and Joynts as ſo many Neſts: which indeed being hid within ſo many diſtinct Cells, remain as the Eggs of Fiſhes, or as the feminine Seed, to which afterwards the acetous ſour recrements of the nervous Liquor come as the maſculine Seed, and renders them fertil, to wit, in as much as the Salts of a divers nature, being commixed, they greatly ferment or grow hot; and ſo by the mutual wreſtling and agitation of the particles, the Membranes and nervous Fibres being notably hauled, they are carried into dolorifick Corrugations. In truth, it from hence appears that the firſt Mine of this diſeaſe as alſo of the common Gout, is to be placed in the bloody Maſs, and to be actuated by the Recrements of the nervous Juice, becauſe when the aſſaults of the Pains ariſe in various parts together, or ſucceſſively, the Blood ſeems not to grow hot above the meaſure, nor its ſalſaments paſſing by *Deliquium* at that time flow out more plentifully; for that neither the Pulſe becomes quicker nor the Urine lixivial. But in an urgent fit, very often a foregoing Headach, an heavineſs of the Head or Vertigo, inquietude of the Members and often a leaping of the Tendons, which ſort of Symptoms often præcede or accom-

company the assaults of pains, argue the sour recrements of the nervous Juice to suffer a flux. To this appertains that the acid liquors being drunk up, provoke the gouty Paroxysms. In the Scurvy indeed either Mine is more plentifully begotten, the nests of the Gout are longer published, and the pains in these do spring sooner by far: besides from a very impure Blood, a saline or tartarous matter is heaped up not only in the Joynts of the Feet or Thighs, but almost every where about the membranes and the interspaces of the Muscles, to which also an acetous *Copula* or joynting being poured out in many places from the nervous Juice, it becomes fruitful of Pains; then for as much as either Mine consists in a matter less thick, and is gathered in open places, it is either washed away in a little time by the *Serum* flowing to it, or it is dissipated by heat, or else being sucked again by the Blood, it is transferred to some other place. PHAR. Part. II.

3. The Rheumatism, as it is described by modern Authors, often comes upon an inveterate Scurvy. Which sort of affection, exciting Pains almost in all parts of the Body, one after another, although it appears like to the wandring Gout, but now described, yet it differs from it both in respect of the pains, which in a Rheumatism quicklier pass over, and oftner change their seat, and that with them are very often joyned a small Fever, and the tumour of the affected parts, and a *phlegosis* or Inflammation; as also by reason of the conjunct Cause, which indeed being of Kin to that which brings forth the scorbutick Colick, is clean contrary to the cause of the wandring Gout: For it seems that in the first preparation of this Disease, an acetous Mine is depolited in very many places from the nervous Juice, as it were the female Seed; to which sort of Symbols left in divers places here and there, whilst that the blood growing hot, pours forth its plentifully rejected saline reliques, presently upon the wrestling and Congression of dissimilar Particles. Pains are caused moreover, because the recrements of the Blood being exposed in the middle of its Course, they something hinder its motion, therefore a tumour and Inflammation is brought upon the part affected then, because the Blood at last licks up again the Matter, but now rejected by it self, and transferrs it to some other place, those often shiftings and mutations of Pains happen. This Affection deserves a peculiar consideration: but this may suffice to have said these few things of it in general, to wit, as it is a symptom of the Scurvy. *3. The Rheumatism.*

Hitherto we have unfolded the Symptoms of the Scurvy, arising from a threefold kind of Cause, the Pathologie of which contains in it self other manifold Affections, and very different in themselves: of which it is worthy to be observed, that as many Diseases, belonging to the Brain and nervous Stock, which exist very often alone and of themselves, come also upon the Scurvy; yet as to their formal reasons and as to the method, to be observed in the curing of these or those, a very great difference occurs. But when a Palsie, Vertigo, Convulsion, Lethargy, and other Diseases, of that kind happen of themselves, they always depend upon a more fixed cause, and very much on some notable fault of the Head and nervous Appendix; and as Cephalick remedies and appropriate to those Diseases only, are convenient, yet the success does not easily nor alwaies answer to their Wishes. In the mean time either little care is taken for the Emendation of the Blood, or if it be, for the most part it is in vain: But when these affections are brought in by the Scurvy, there is less danger, and although they have oftner fits, yet they more easily pass away; but the cure of the Disease is performed more happily by Antiscorbutick Remedies then by Specificks & by reduction of the Blood to a due *Crasis* or Complexion, rather then by administring any thing to the evils of the Brain and nervous Stock. The same observation is to be had in Tumours, Ulcers, the Dropsie & many other Distempers brought in by the Scorbutick infection, which otherways when excited by themselves, are healed only with antiscorbutick Remedies. The reason of which is, that in the Scurvy, the conjunct cause of the Symptoms and of very many Affections, consists for the most part only in the humours, to wit, in the Blood and nervous Juice, and not in the solid parts, *viz.* the *Viscera*, *Præcordia* and Brain, wherefore when their Dyscrasies or evil dispositions may be more easily mended, then the evil formations of the other Diseases of this kind, are more certainly and easilier or with less trouble cured, when excited by reason of the Scurvy than when they come to themselves. But when the Disease is more deeply rooted, and that the principle solid parts are hurt, (as it many times happens) *viz.* when the recrements of the Blood and nervous Juice, being impacted for a long time in them hurt their Tone, stuff their Pores and Passages, and bring forth in them Scirrhous Tumours, very often, or Ulcers; the aforesaid Symptoms, although imputed only to the Scorbutick Taint, seldom or never admit of a Cure, and by reason of this invincible Cause, at last the Scurvy is self becomes desperate and deplorable. *How the Diseases differ being excited by themselves, and brought on by the Scurvy.*

CHAP.

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CHAP. VI.

The Prognosticks of the Scurvy.

The Prognosis in the Scurvy ought not to be without consideration.

WHen in the scorbutick affection very many and sometimes very cruel and horrid symptoms together are wont to oppress, there is expected a *prognosis* from the Physician: Yea he himself, that he may the better institute the method of Curing, carefully weighs what may be the future event of the Disease: Notwithstanding Judgments in this case ought to be cautious, a long while suspended and not too rash, for very many (as have fallen under our observation) esteemed desperate, have grown well. I have known some whom a frequent and horrid *Asthma* had already seemed to have choaked, others continually dying with frequent swooning, and also others troubled either with the Palsie, or convulsive Paroxysms, or with a most grievous Colick, to be wholly freed in a short space by the help of Medicines. I have again known some scorbuticks swelled with the Dropsie through their whole Body, others reduced by an Atrophy to an extreme leanness, at last restored to perfect health. Therefore although those labouring with this Disease, are sometimes urged with affections highly dangerous, yet if the *Viscera* be still indifferently whole or at least not much vitiated, we ought not to despair of those evils, excited through the mere taint of the Scurvy. But on the contrary, when symptoms less terrible appear, if the Contents of the *Hypochondria* and *Abdomen* become hard and as it were schirrous, or if the Lungs begin to be corrupted; there is no great matter or benefit to be promised as to the cure of the Disease: But in cases not desperate, where a hope of recovering health is left, or at least the fear of sudden death is far off, if perchance the question be asked how soon or how long, how easily or difficultly the Cure may succeed, let the answer depend on these sorts of judgments.

1. The Scurvy as it does not strait kill those affected with it, or precipitate them into an incurable state, so neither is it soon or easily cured: For the chief cause of the Disease consisting in the dyscrasie of the Blood, is not easier to be taken away, than Wines to be restored to their due complexion when they are made fretted or ropy: Wherefore those corrupted with this taint, endure its hurt for many months, and sometimes years, yea sometimes through their whole life.

2. This Sickness depending on the sulphureous-saline intemperateness of the Blood, or like to the mere hot fretted Wine is more hardly cured; than if the same proceeded from the saline-sulphureous dyscrasie, or less adust like to ropy Wine: For this evil constitution of the Blood or Wine, may be after a sort brought again to the condition from whence it fell, but that is wont not easily to be reduced into the state which it departed from.

3. The Scurvy coming upon long Fevers and other Chronical Diseases, is cured, or coming upon an originally, or for some other occasions, sickly constitution, is esteemed of a more difficult cure, because indeed in these cases both the *Crasis* of the Blood is more vitiated, and not seldom also some hurt is affixed to the *Viscera*. Next to these they are hardly cured, who by reason of an evil manner of living, and chiefly by the assiduous drinking of the more generous Liquors, have contracted this taint with hurting the tone of the Ventricle and other *Viscera*: But those who are become scorbuticks by reason of Contagion, the unhealthfulness of the Air, going to Sea, or a sedentary Life, are more often and with less trouble restored to health.

4. This Disease being yet fresh, so long as the taint being included only in the bloody Mass, is not yet impressed on the Brain and nervous stock, nor hath excited durable symptoms in the solid parts, often admits of a perfect Cure: But if the affection being more deeply rooted, is propagated into the animal Kingdom, and there produces spasmodick and dolorifick passions, and that its poyson hath spread it self more largely by the eruption of spots and breakings forth, and by the rosion or eating away of the Gums and Teeth, and by other pathognomick signs, it is scarce ever wholly extirpated; but the chief business of Medicine is imployed in giving help to the Symptoms most grievously urging, and in suppressing their encrease and extremities.

5. Those who labour with an inveterate Scurvy, refuse to live moderately, but indulge their sickly appetite, readily desiring what is nought: And besides they are very morose and difficult to take Remedies, so that they very often delude the labour of the Physician that in truth it is better to leave them to their evil *genius*, than to de-

same

fame profitable Medicines preſcribed in this caſe altogether in vain.

6. Becauſe this affection growing grievous, the morbifick matter is manifold and of divers ſorts, ſo that the cauſe of the Symptoms of a various kind and nature, is engendred; therefore Remedies not only of one kind are adminiſtred, but when a certain method of Medicine, though preſcribed with the beſt judgment, profits little or nothing in the Cure, the ſick are not preſently to be left off, but other medicaments and then others are to be tryed: For indeed the ſame things are not convenient to all, nor always to the ſame perſon. In the ſick Body the powers and combinations of Salts and Sulphurs every where vary, ſo alſo Medicines not helping ſhould be as often changed, till ſomething congruous and helpful be light upon.

7. If that notwithſtanding or by the uſe of Remedies not rightly adminiſtred, the Scurvy by degrees growing grievous, is carried daily into a worſe condition, at length it induces a Dropſie or Conſumption, the next paſſage then is to Death, either from this or that Diſeaſe: For after that the Blood is very much depraved, it pours forth its recrements, being more plentifully heaped up either on the Lungs, or in the *Viſcera* of the lower Belly; and ſo cauſes an affection of this or that kind equally mortal.

CHAP. VII.

Of the Cure of the Scurvy.

AS to what reſpects the Cure of the Scurvy, for that it is not one ſimple preternatural affection, but a whole Legion that is to be put to flight; therefore the method of Curing ought to comprehend manifold indications, and thoſe variouſly complicated and ſubordinate, which after the ordinary mode may be referred to theſe three heads: to wit, that they be preſervatory which reſpect and take away the cauſe of the Diſeaſe, and curatory which reſpect and take away the Diſeaſe it ſelf and its ſymptoms, and laſtly vital, which may defend or reſtore the power and ſtrength of the Patient. *The Indication three-fold.*

At the very beginning of the Cure we ought to aim at the cauſe of the Diſeaſe, for this like the Root being cut off or pulled away, preſently the Trunk, Branches, and Fruit wither: Therefore as we have ſhown the cauſe of the Scurvy to be founded in the dyſcraſie of the Blood, *viz.* being either ſulphureouſly-ſalt or ſaltiſhly-ſulphureous; the firſt work muſt be that it may be mended and made better, both of this or of that ſort or nature. To this end in the firſt place impediments are to be taken away, then the primary intention it ſelf is to be performed; for either ſcope or purpoſe Remedies are required, from Diet, Chirurgery, and Medicine: As to Diet, there ſhall be ſhewn hereafter a ſpecial method of living, in the mean time we will proceed to the reſt. 1 *Preſervative.*

The Reduction of the Blood to its due *Craſis* by appropriate Remedies, is chiefly hindred by theſe two ways, *viz.* In the firſt place, becauſe a proviſion of vitious nutritious Juice is continually inferred by it: Then Secondly, becauſe the Recrements brought into its boſom are not ſufficiently ſent away, through convenient ſinks: Therefore care muſt be taken that the buſineſs of the Chyle may be rightly performed in the firſt paſſages, both that the vaporous Recrements may be ſufficiently purged forth by Sweat, the ſerous by the Reins and Lymphæducts, the bilous, by the galliſh *Cyſtis*, the melancholy of the Spleen, and all the others of every kind by their proper emunctories; then theſe offices being rightly inſtituted we muſt endeavour to reduce by ſpecifick Medicines, and chiefly thoſe endued with a volatile Salt, the dyſcraſie of the Blood. Remedies reſpecting every one of theſe intentions, ought to be uſed and adminiſtred together, but by what means and by what manner of adminiſtrations, ſhall be yet more particularly deſigned.

1. That the Chyle may be perfectly concocted in the firſt paſſages, care muſt be taken that the load of excrementitious matter heaped up in them may be exterminated, that the ferment being loſt or depraved may be reſtored, that the paſſages and pores any ways ſtuft and obſtructed may be opened: To theſe ends, Cathartick, Digeſtive, and opening Medicines are deſtinated. *The Therapeutick Intentions.*

2. The Excrements gathered together in the bloody Maſs, when they are not ſufficiently ſent away by their proper emunctories, may be drawn forth by other convenient ways: For this purpoſe alſo Catharticks or Purgers, and beſides Diaphoreticks and Diureticks, or Medicines that evacuate by Sweat and Urine, are convenient.

3. The ſcorbutick dyſcraſie of the Blood ſhould be mended by Phlebotomy and ſpecifick Remedies: Wherefore that the whole buſineſs of the preſervatory indication may

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may be reduced to one point, the Remedies which perform its chief intentions are Catharticks, Blood-letting, Digeſtives, opening Medicines, Diaphoreticks, Diureticks, and Anti-ſcorbuticks or Specificks. Then, for that indeed Digeſtive and opening Medicines are imbued, either of them with acid, biting, or ſaline Particles, they more often overcome; beſides, for that Medicines of this ſort move conveniently enough by Sweat or by Urine, therefore the Curatory proviſion requiſite to the aforeſaid intentions, may be yet reduced to ſtraiter limits; to wit, that it may almoſt only conſiſt in Cathartick, Digeſtive, and Anti-ſcorbutick Medicines; to which Phlebotomy may be added as occaſion ſerves: It now is my part to deſign ſome forms and preſcripts of them, and alſo the manner of uſing them.

Purging.

Purging.

1. The method preſcribed for the Curing almoſt of all ſcorbutical perſons, begins with Purging Medicines; for unleſs the firſt paſſages are made clean, Medicines deſigned for any other uſe are infected by their filths: wherefore Vomiting ſometimes is no leſs convenient than Purging.

By Vomit. If the Ventricle (as it is often wont to be) is grieved with a viſcid, ſouring, and unſavory matter, and endeavours to caſt out the impure Load, by a nauſeating and ſtriving to vomit, and if the Patient is wont to bear ſuch an evacuation ſtrongly enough and with eaſe, there is no hindrance, ſo that their ſtrength be not too much decayed, but that an emetick Medicine may be adminiſtred: For the more ſtrong, let them take an infuſion of *Crocus Metallorum* or *Mercurius Vitæ*, or the *tartarous Emetick* of *Mynſichtus*, or *Glauber*'s *Sulphur* of *Antimony*: Thoſe who are of a more thin and weak Conſtitution, let them take *Wine* of *Squills*, or the *Gilla* of *Theophraſtus*: Let thoſe who take but a ſmall doſe, drink after it good ſtore of Poſſet drink, till the Ventricle being full to nauſeouſneſs, Vomiting may be the more eaſily provoked, by ones Fingers or a Feather thruſt down the Throat, which may be reiterated as often as they pleaſe. By this way of Vomiting the mere Contents of the Stomach being wiped from its foldings are ſent forth; neither are there ſtirred up in any other of the *Viſcera* about it, or in the Membranes (as it is wont to happen from Stybiates or Antimonial Emeticks) painful haulings or Convulſive, with ſwooning or fainting away. To thoſe whoſe Ventricle, by reaſon of evil digeſtion, eaſily gathers together a load of Phlegm or other degenerous matter, I have preſcribed (and often with good ſucceſs) ſuch a Vomiting once a month, which they have found ſafe and wholeſome.

By Stool. Where there is no need of Vomiting begin by a Purge, at leaſt let there be ſome days between this and the other evacuation if this follows. I judge what in times paſt has been inculcated, by Authors, concerning the preparation of the humours, to be either needleſs, or the circulation of the Blood not underſtood, to be altogether erroneous: But in the place of that intention are ſubſtituted things reſtoring the Ferment of the *Viſcera*, and things altering the *Craſis* of the Blood: In the mean time, that the filth of the firſt Paſſages and the recrementitious ſuperfluities both of the Blood and alſo of the nervous Liquor may be ſent forth; in the firſt place a light and gentle Purge is ordered and afterwards once a week it may be either oftner or ſeldomer repeated according to the ſtrength of the Patient, and the ſtrength of the Medicine may be proportionated according to the ſucceſs of the firſt Doſe. To this end Pills, Potions, Apozems, Electuaries, Powders, and many other forms of Medicines are wont to be preſcribed.

Remedies made known in a more hot Scurvy. If the Conſtitution of the ſick be more hot, and that the Scurvy ſeems to be founded in an aduſt Diſcraſie of the Blood, *viz.* a Sulphureous-Saline, all Aloetick, and Diagrydiat Purges are to be ſhunned, and only the more temperate made out of Senna, Rhubarb, and others which do not too much agitate the Blood and Humours, are to be adminiſtred.

Pills. Take of the leaves of Senna ℥j, of Rhubarb ℥vj, of Epithymum ℥iij, Roots of Polypodium of the Oak, of Engliſh or Monks Rhubarb dryed, of each ℥ß, of yellow Sanders ℥ij, of Celtick Spike ℥ß, of the Salt of Wormwood ℥ij, being cut and bruiſed, let them be digeſted in a Glaſs, in hot Sand, with white Wine and Fumitory Water, of each a Pint (or a Quart of our Magiſterial antiſcorbutick Water) for two dayes the Colature being clear, let it be evaporated in the gentle heat of a Bath, to the conſiſtence of Hony, then add to it of the Powder of the leaves of Senna, and of Rhubarb, of each ℥j, of the Cream of Tartar ℥iſß, make a Maſs for Pills. The Doſe from ℥ß to ℥j.

Syrup. Or prepare the ſame infuſion, which being evaporated by a gentle heat, to the conſiſtency of a Syrup by adding at the end, of cleanſed Manna and white Sugar, of each ℥ij, make a Syrup. The Doſe from j to ij ſpoonfuls in a convenient Vehicle.

Or

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Or of the Tincture of the ſame may be given ʒiiij or vj for a Doſe, by adding of the Cream of Tartar ʒß, and if there be need of Sweating, of the Syrup of Pippins ʒiij.

Tincture. Of Raiſins.

Or put to the preſcribed Tincture of Corinthian Grapes cleanſed ʒvj, let them be digeſted hot till the Grapes Swell, which being taken forth, evaporate the Liquor to the Conſiſtence of a Syrup, adding to it of Sugar and cleanſed manna, of each ʒiß, then the Grapes being laſtly put into it, let the Medicine be kept in a glaſs Veſſel, cloſe ſtopped. The Doſe from one ſpoonful to two.

Electuary.

Or add to the aforeſaid Tincture, being evaporated to the half part, of freſh Caſſia, and of the Pulp of Tamarinds, extracted with antiſcorbutick Water, of each ʒiij, of the Conſerves of Violets, of Damask Roſes each ʒij, of the Powder of Senna, of the greater Compoſition ʒj, of the Powder of Rhubarb ʒß, of Cream of Tartar, of the Species of Diatrion Santalon, each ʒij, let them be bruiſed together in a Stone Morter, till they are reduced to the form of an Electuary. The Doſe about the bigneſs of a Walnut more or leſs, according to the ſucceſs of the Operation.

Powder.

For thoſe whoſe Stomachs being full of loathing and will not admit of the Medicines, but in a ſmall quantity and elegant form: Take of the Reſine of Scammony *gr.* iiij to viij, of the Cream of Tartar ϑß, of Celtick Spike *gr.* vj, mingle them and make a Powder, let it be given in a ſpoonful of Gruel, or in the form of Pills.

Purges in a more cold Scurvy.

Thoſe who labour with the ſcorbutick Indiſpoſition, and are of a more frigid and cold conſtitution, and where the Diſeaſe ſeems to be founded in a Nitro-Sulphureous diſpoſition of the Blood, like to ropy Wine, are to have adminiſtred to them more ſharp Catharticks endued with more hot Particles.

Pills.

Take of Stomach Pills with the Gumms ʒij, of the Reſine of Jalap *gr.* 20, Vitriolat Tartar *gr.* 16, Oyl of Juniper ϑß, with as much as will ſuffice of Ammoniacum, ſoluted in the Water of Earth-worms, make Pills 16, take 4 at a time once in 7 days.

Take of Pilulæ Tartar of *Bontius* ʒiß, of the reſine of Jalap *gr.* 12, of the ſalt of Tartar ϑß, with what will ſuffice of Auguſtan Syrup, make Pills, 12.

Extract and Syrup.

Take of the Extract of Pil. Ruffi ʒj, of the Extract of black Hellebore ϑj, of the Salt of Tartar ʒß, with what will ſuffice of Ammoniack ſolute, make 9 Pills to be taken, 3 for a doſe.

Take of the Leaves of Senna ℥j, of Rhubarb ʒvj, of Mechoachan, Turbith: with Gums, of each ℥ß. of the Strings of Hellebore black ʒiij, of the Salt of Tartar ℥ij, of yellow Sanders ʒiß, of Winteran Bark ʒij, being ſliced and bruiſed let them be digeſted in a Quart of Whitewine for two days, let it be ſtrained without preſſing it, and take of it by it ſelf, from ℥v to ℥vi, either in the extract or reduced to a Syrup, or electuary as the Tincture above deſcribed, but adding of as much as will ſuffice of the Powder of Arthritice, or of Diaſena.

Tincture.

Or, there is prepared a Tincture of this ſort, which may be given to ſtrong men, from half a Spoonful to a Spoonful. Take of Salt of Tartar ℥j, of the ſmaller Spirits of Wine lbjß, let them digeſt till it becomes Yellow: to this being poured off from its Fæces, put of the Leaves of black Hellebore macerated in Vinegar ℥j, of yellow Sanders ʒj, the yellow part of Orange ʒiß, let them digeſt being cloſe ſhut up and warm for 3 days. The matter being Strained clear, let it be diſtilled in Balneo to the half part, the remaining Liquor keep for Uſe.

Apozemé.

Take of ſharp-pointed Docks, of Polypodium of the Oak, ſtinking Nettles, and of Chervil, of each ʒvj, of the Leaves of Eupatorium and Betony, each j handful, of White Sanders and of Yellow, each ʒiß, wild or baſtard Saffron ℥j, of the Tartar of White-Wine ℥ß, boyl them in three Pints of Spring Water, or lbijß, till half is conſumed, add to it of Rheniſh-Wine lbj, and preſently let it be ſtrained, to which put of the beſt Senna ℥ß, the Yellow Rind of the Orange ʒij, Rhubarb ʒvj, of the Leaves of Black Hellebore ℥ß, infuſe them being warm and cloſe ſhut for 12 Hours, being ſtrained, let it be kept in a Glaſs cloſe ſtopped. The Doſe is ʒv to vj.

We might here add many other forms of Purges, but there is no great need of variety in theſe: of the aforeſaid, either theſe or thoſe which ſhall be thought moſt convenient, let them be adminiſtred, and every 5 or 6 days as occaſion ſhall require iterated. Too often and violent purging, deſtroys the ſtrength and very much waſts the force of the *Viſcera*, and in the mean time takes not away the Diſeaſe.

Phlebotomy.

After a Purge or two, if there be any need of taking away Blood, let it be done either by Phlebotomy in the Arms, or by Leeches in the Veins of the Fundament. It is not much matter which Vein is Cut: nor is there ſo much benefit in the opening the Salvatella, as hath been commonly thought The great ado among Authors, who were ignorant of the Circulation of the Blood, about opening the Cephalick, or the Liver Vein, or any other chiefly in the Scurvy comes to nothing. Phlebotomy is indicated

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by the plentifulneſs and Vitiouſneſs of the Blood, which rather ought to be performed by taking away a ſmall quantity often, than a great deal all at once: For when the bloody Liquor becomes very impure, it is not more certainly mended by any kind of Remedies, than by letting it forth often and ſparingly. For as often as the old corrupted Blood is let forth, freſh, better and more pure ſucceeds. In the mean time there is need of Caution, leſt too great quantity be taken away at once, for its ſtock being diminiſhed together, Sanguification grows weak, and for that reaſon a Dropſie, or a Cachexia, or evil diſpoſition of the whole Body follows.

After Purging, and (if need be) Phlebotomy, many other kinds of Remedies, no leſs neceſſary, are required in the Scurvy: In the preſcribing of which in order, we ought preſently to conſider whether the Indications being only Preſervatory they may have place here, or ought not to be deferred to thoſe which are contrary, to wit, thoſe which reſpect the more grievous Symptoms: But if you endeavour the whole buſineſs of the Cure againſt the cauſe of this Diſeaſe, proceed according to the following method: It ſhall be ſhown hereafter what ſort of Cure is to be adminiſtred, (if perchance occaſion requires) to the Symptoms.

Therefore if the buſineſs of Medicine be chiefly deſigned againſt the cauſe of the Scurvy, and that it may be firſt eradicated by it ſelf, for this end, as we ſhewed but now, there are moreover to be made uſe of at all times except on the days of purgation, Digeſtive and Specifick, or antiſcorbutick Remedies: to which ſometimes if need be, may be added Diaphoreticks, or Diureticks, or Medicines operating by Sweat or Urine. The forms of Medicines, for the performing theſe kind of Intentions, and manifold preſcriptions, and of various kinds, are every where extant among Authors. It pleaſes me however, to place here ſome of the more ſelect, which I think good to diſtinguiſh into two Claſſes, according to the twofold nature of the Scurvy, to wit, the ſulphureous Saline, and Saline Sulphureous. And in the firſt place we will deliver what is convenient in the latter Diſtemper, to wit, where there is need of Medicines, indued with a certain Incitation, and very much filled with a volatile Salt.

Digeſtives. Digeſtive Remedies, which reſtore the Ferment of the Ventricle, and help its Function, and alſo of the other *Viſcera* ſerving to the Chyle; and Antiſcorbutick or Specifick, which take away the Dyſcraſie of the Blood, are either joyned in the ſame Compoſition, or at leaſt they are to be taken ſucceſſively the ſame day.

Among the Digeſtive Medicines, are deſervedly ranked, Cream of Tartar, Cryſtal Salt, and Tincture of Cryſtal, Vitriolate and Chalybeate Tartar, Elixir *Proprietatis*, ſimple Mixture: The uſe of every one of theſe given twice aday, does oftentimes prove beneficial.

Beſides you may eaſily make with the two following *Menſtruums* magiſterial Tinctures and Elixirs of divers kinds and digeſtives, appropriate to the Scurvy.

Take of the Spirit of Vitriol rectified ℥vj, of the Spirit of Wine Alcholiſated ℥xvj, mix them and diſtil them in a Glaſs Retort, with three Cohobations: Keep it for uſe in a Glaſs very well ſtopped. The Elixir *Proprietatis*, is better and more eaſily prepared with this compounded *Menſtruum*, than the ordinary way.

Take of Winteran Bark, of *Lignum* Aloes, of the Roots of the leſſer Galangal, each ʒij, of Cinnamon, Cloves, Cubebs each ʒj, *Ameos* or Biſhops Weed and Naſturtium Seeds, each ʒß, being bruiſed, pour on them the aforeſaid *Menſtruum* till it be 3 Fingers breadth above them, let them digeſt in a Veſſel, in a Sand Furnace for 6 days. Strain it and keep in a Glaſs cloſe ſtopped. The doſe 20 drops, more or leſs in a ſpoonful of Canary Wine or proper Water. Let it be given twice a day.

Take of the whiteſt Amber, of Gum Hedera, Caranna, Tacamahaca, each ʒj, of Saffron ʒß, of Cloves, Nutmeggs, each ʒij, bruiſe them and pour on them the aforeſaid *Menſtruum*, and as before draw forth a Tincture. The doſe 20 drops as before.

Take of the Salt of blew Tartar iiij, let them digeſt with lbj of the Spirit of Alcholiſate Wine to the Extraction of the Tincture. This is the other *Menſtruum*, whereby you may prepare Elixirs out of Gumms, Spices, *&c.* after the ſame manner as with the former *Menſtruum*.

Specifick's or Antiſcorbuticks. Whilſt theſe ſorts of Remedies are adminiſtred in a ſmall doſe morning and evening, or firſt and laſt at Medicinal Hours, to wit, before eight in the morning, and four in the afternoon: other kind of antiſcorbutick Medicines are to be taken, which for the moſt part we are wont to preſcribe in a double form, to wit, ſolid and liquid to be taken together, ſo that the ſolid being firſt taken the other may be drunk after it: Of either there are very many Species and ways of Compoſition extant: *viz.* in the ſolid form, Electuaries, Confections, Powders, Pills, Tablets or Lozenges: In the liquid are Decoctions, Infuſions, Expreſſions, diſtilled Waters, and medicated Wines and Ale. Of every one of theſe kinds we will propoſe ſome more ſelect Medicines.

Electuaries.

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Electuaries.

Take of the Conſerves of the Leaves of Scurvy-graſs, of Roman Wormwood, of Fumitory, of each ℥ij, of the Powder of Winteran Bark, of the Roots of Angelica, Aron, each ʒij, of the Species of Diatrion Santalon ʒjſ℈, of the Powder of Crabs Eyes ʒj, of the Salt of Wormwood ʒij, with what will ſuffice of the Syrup of Citron Peels, make an Electuary.

Take of the Leaves of Scurvy-graſs, Conſerve of Brook-lime, made with an equal part of Sugar, of each ℥iij, of the Troches of Capers and of Rhubarb, each ʒij, of the Salt of Wormwood and of Scurvy-graſs, of each ʒj, of the Powder of Ivory and Coral calcined, of each ʒj, make it up into an Electuary with as much of the Syrup of the juice of Scurvy-graſs as will ſuffice.

I was wont to preſcribe Conſerves of the exterior Bark of Limons and Oranges, alſo of the Purple Flowers of the Aſh-tree, of the Leaves and Flowers of Cardamine, of the Roots of ſharp pointed Docks, and Engliſh Rhubarb prepared with an equal part of Sugar, which of themſelves or mixed with other Conſerves and *ſpecies* of the ſame kind are made into an Electuary.

Take of the Conſerves of the yellow part of Oranges and Limons, of the flowers of the Aſh Tree, of each ℥ij, of the Powder of the Roots of *Contrayerva* ʒj, of the leſſer Galangal ʒiſ℈, of the Roots of Aron ʒij, of the *Species Aromatic. roſat.* ʒj, of the ſalt of Wormwood ʒij, with as much of the Syrup of Candied Nutmegs, as will ſuffice to make it up into an Electuary. The doſe of theſe kind of Medicines is the quantity of a Nutmeg, drinking after it ſome proper Liquor.

For Country people and the poorer ſort, for whom leſs dear and more eaſily to be prepared Medicines are required, I preſcribe after this manner. Take of the leaves of Scurvygraſs and Brooklime, of each ℥iiij, of the whiteſt Sugar ℥viij, let them be well beaten in a Mortar together, adding of Winteran Bark powder ʒiſ℈, of Tartar calcined with Nitre ʒiij, with as much Spaniſh Wine as will ſuffice, let it be made up into an Electuary. The doſe about the quantity of a Walnut twice in a day, drinking an appropriate Liquor after it.

Take of the leaves of Scurvy graſs ℔j, of Raiſins of the Sun ſtoned, of white Sugar, each ℔ſ℈, the boylings of wild Radiſhes ℥ij:—Let them be beaten together in a Mortar, and reduced to the form of an Electuary. The doſe is about the quantity of a Walnut twice or thice in a day.

Confections.

Take of Aron compound ℥j, of the powder of Winteran Bark ℥ſ℈, of the *Species* of *Diatrion Santalon*, of the Troches of Capers, each ʒij, of the ſalt of Wormwood and of Scurvygraſs, each ʒjſ℈, of the rinds of Candied Oranges ℥iij: Let them be bruiſed in a Mortar together, then add of white Sugar diſſolved, in as much as will ſuffice of the water of Earth Worms ℥iij, and ſo make it up into a Confection.

Take of the Roots of *Eryngo* and *Scorzonere* candied, of each ʒij of Walnuts and *Myrobalans* candied, each *N°.* ij, of electuary of *Saſſaphras* ʒvj, of the powder of Cubebs and Cardamums each ʒij, of the powder of the Roots of Zedoary, and of Angelica, each ʒjſ℈, of the ſalt of Wormwood ʒij, with as much Syrup of candied Walnuts as will ſuffice: Make a Confection.

Take of the powder of *China* Roots, of Saſſaphras wood, each ℥ſ℈, of yellow and white Saunders each ʒij, of the ſeeds of Rocket, Cubebs, *Naſturtium*, grains of Paradiſe, of each ʒiſ℈, of the *Species Dialatea*, Cinnamon, Orris, the leſſer Galangal, each ʒj, of the ſalt of Wormwood ʒij, of the Conſerves of the yellow of Oranges, and of Sugar *anthoſat.* ℥iij, diſſolved in as much water of Snails as will ſuffice, and as before make a Confection: The doſe as much as a Nutmeg twice aday, drinking after it ſome appropriate Liquor.

In ſome caſes of the Scurvy, whence there is need of the uſe of Steel, or of Steel prepared with Sulphur, add of it ʒiij, or of Vitriol of Steel ʒij, to any of the preſcriptions of the Confections or Electuaries, and after the taking of the Medicine once or twice aday, exerciſe the Body according to its ſtrength. *Chalybeat Medicines.*

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Powders.

Take of the powder of Aron compounded ʒjſß, of Winteran Bark ʒſß, of Cubebs, the grains of Paradiſe and of Cardamums, each ʒij, of the Salt of Wormwood ʒiij, of the Orange Tablets ʒiij. make a Powder: The doſe ʒj in a proper Liquor.

To the aforeſaid Powder add of the Nuts of the Indian Fruit *Cacao* ℔ßſß, let it be brought into a Maſs or Paſte in a warm Mortar, the doſe ʒij, Let it be taken after the ſame manner as Chocolate, *viz.* boyled in Spring water with either Roſemary flowers or Betony, or with the Roots of *Scorzonere*, or alſo with the ſhavings of Ivory or Hartshorn.

Pills.

For thoſe who had rather have the Medicine in a leſſer doſe, and Form of Pills; take of the Roots of Virginian Snakeweed, *Contrayerva*, each ʒij, of Winteran bark, ſeeds of Rocket and of Cubebs, each ʒiij, of the ſalt of Wormwood and of Scurvygraſs each ʒjſß, of the extract or the rob of Juniper ʒſß, and with a ſufficient quantity of the Syrup of preſerved Nutmegs, make a Maſs: Doſe 4 Pills aday, drinking after them ſome proper Liquor.

Tablets or Lozenges.

For the more delicate Tablets or Troches are preſcribed after this manner: Take of the powder of Winteran Bark, of the eyes of Crabs, each ʒiſß, of the powder of Pearls ʒſß, of the fineſt Sugar ʒvj, diſſolved in as much water of Earth-worms as will ſuffice, and boyled up to the height of Tablets: Add of the Spirits of Scurvy-graſs ʒij, of which make Lozenges or Tablets, each weighing ʒſß, take about ʒj twice aday, drinking an appropriate Liquor after it.

The Orange Tablets ſold in the Apothecaries Shops in Oxford.

TAke of the Rinds of Oranges, Limons, and Citrons preſerved, of each ʒj, of preſerved *Eringo* Root ʒiß, of Pine Nuts and Piſtaches each 20, of ſweet Almonds blanched number 10, of the powder of Anniſeeds ʒiß, candied Ginger ʒij, *Species* of *Aromatic. Roſat.* and of Nutmeg each ʒj, of the Roots of Galanga ʒj, ten Cloves, of Amber grieſe *gr.* iiij, of Musk and Civet of each ij grains, of the whiteſt Sugar ℔iß diſſolved in Roſe-water, and boyled up to a Tablet: Of which make Troches or Lozenges as before.

Liquid Medicines.

So much for Medicines in a ſolid form or more thick ſubſtance, that are wont to be given to ſcorbutical perſons: That the virtue of which might be the better and with the greater benefit, carried into the maſs of Blood, for the moſt part liquids are preſcribed to be drunk after them: Although great variety of them and divers ways of compounding them are extant, yet the chiefeſt and moſt uſual are thoſe we mentioned above, and ſhall now ſubjoyn the forms of each of them.

1. *Decoctions.*

Although Decoctions are the moſt familiar kind of liquid Medicines, yet more rarely made uſe of in the Scurvy, becauſe the ſimples which are chiefly beneficial to this Diſeaſe, as Scurvygraſs, Brooklime, *&c.* loſe their virtues received from the volatile Salt by boyling; yet becauſe Remedies by this means are eaſily and ſuddenly prepared, they ought to be admitted ſometimes, for that it has been found by experience, that they have ſome efficacy. For Country and poor People, an eaſie Medicine by this preparation is commended by many Authors. Take of the leaves of *Naſturtium Aquaticum* or water Creſſes iij handfuls, of the leſſer Sorrel *m* ij, being bruiſed let them

them be macerated or ſteeped in ſix pints of Milk, and then boyled till the third part be conſumed: Take of it from 6 to 8 ounces twice aday. A Decoction of Wormwood is praiſed by *Eugalenus* and others, the following Remedy I have often tryed with good ſucceſs. Take of the tops of Broom *m* iij, cut ſmall and boyled in 3 pints of ſtrong Ale till half be conſumed; let it be taken from ij to iij ounces twice in a day.

2. *Infuſions.*

An Infuſion being added to the Decoction, makes a moſt profitable Medicine. Take of the Roots of *Scorzonere*, of Chervil, each ℥j, of the leaves of *Eupatorium* and *Chamepitys*, each *m* ſ℔, of burnt Hartshorn ℥ij, of Raiſins *m* ſ℔, boyl them in 3 pints of Spring water till the third part be conſumed, add then of Rheniſh Wine half a pint, and preſently ſtrain it into a glaſs veſſel, to which put of the leaves of Scurvygraſs and Brooklime each half a handful, of the rinds of Oranges ſteeped and cut ſmall ℥ſ℔, make an Infuſion warm and cloſe ſtopped for ſix hours, ſtrain it and let it be kept in a cloſe Veſſel: The doſe ℥vj twice in a day after a ſolid Medicine.

Take of Whey made with Whitewine or Cider ℔ ſ℔, boyl in this of the Roots of Burr docks and *Eringoes* ſteeped, of each ℥vj, of preſerved Juniper Berries ℥ſ℔, the liquor being boyled away to the third part, let it be ſtrained into a Jugg, to which let there be put of the leaves of Scurvygraſs and of Brooklime each *m* j, make an Infuſion warm and cloſe ſtopped for 6 hours: The doſe half a pint twice in a day, after a ſolid Medicine.

Sometimes Infuſions made by themſelves are of notable uſe. Take of the leaves of Scurvygraſs *m* j, the ſlices of Horſe-radiſh Roots *m* ſ℔, Winteran Bark bruiſed ℥ij, let them be put in a glaſs Veſſel with Whitewine or Cider, and Scurvygraſs water, each ℔j, let an Infuſion be made in a Cellar for 2 or 3 dayes: The doſe ℥vj to viij twice in a day as before.

3. *Juices and expreſſions.*

'Tis alſo a very commendable uſe to take twice or thrice in a day, of the Juice of antiſcorbutick herbs or fruits or their expreſſions, by themſelves or with their appropriate Liquors, for ſo it is preſumed, the virtue of the Remedy is exhibited whole and undiminiſhed.

Take of the leaves of Scurvygraſs, of water Creſſes and of Brooklime each *m* iij, being bruiſed let the Juice be wrung out hard, and kept in a cloſe Veſſel: The doſe ℥iſ℔ to ℥iij twice in a day, in a draught of Ale, Wine, or diſtilled Water.

Take of the leaves of Scurvygraſs *m* iiij, of Wood-ſorrel *m* ij, being bruiſed let the Juice be preſſed forth, which being put into a Glaſs cloſe ſtopped will quickly grow clear; for the ſharpneſs of the Wood-ſorrel precipitates the thicker parts of the Scurvygraſs: The ſame alſo happens if the Juice of Oranges is mingled with the Juice of Scurvygraſs, the doſe ℥ij, or ℥iij twice in a day.

Take of the leaves of Scurvygraſs *m* iiij, of Brooklime and of water Creſſes each *m* ij, of long pepper ℥iij, of the ſhavings of Horſe-radiſh ℥ij, all being bruiſed together let them be put into a glazed Veſſel, with Rheniſh or Spaniſh Wine which is beſt liked ℔ij, the mouth being very cloſe ſhut, let it ſtand in a cold Cellar for two dayes, then let it be preſſed forth ſtrongly: The doſe is ℥iij twice in a day, after a ſolid Medicine.

Take of the leaves of Scurvygraſs *m* iij, of Brooklime and water Creſſes and of Wood-ſorrel, of each *m* j, being bruiſed pour on them of the water of Snails and of Earthworms each ℥vj, make an Expreſſion ſtrongly, which keep in a Glaſs cloſe ſtopped: The doſe ℥ij twice aday.

4. *Syrups.*

For the ſame reaſon as Decoctions ſo alſo Syrups are but little uſed in the Scurvy, for as much as the virtue of the ſimples chiefly efficacious, evaporates in the boyling; yet becauſe there is need ſometimes for ſweetning of appropriate Liquors with ſuch a Medicine for ſome; we will propoſe here our preparation, the ſtrength of the ingredients being preſerved as much as may be.

Therefore take of the leaves of Garden Scurvygraſs *m* vj, of the rinds of 4 Oranges and two Limons cut very thin, of the ſlices of Horſe-radiſh *m* ſ℔, of long pepper powdered

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powdered ℥iij, all being bruiſed together let the Juice be preſſed forth, which being preſently put into a cloſe ſtopped Glaſs, place in a cold Cellar till it ſettles and grows clear, then the Liquor being clear pour it off ſoftly into another glaſs, and being faſt ſhut let it be kept warm in *Balneo Mariæ*: In the mean time for every ounce, take of Sugar ℥iſs, and let all the quantity be diſſolved in as much of the water of Earthworms, and boyled up to a thickneſs, to which let the aforeſaid Liquor be poured by degrees, warm and ſtirred together with a *Spatula*: As ſoon as it is incorporated let it be taken from the fire, and being cold let it be put into a glaſs, and in this hang tyed up in a little Rag; of Cinnamon bruiſed ℥iſs, of the ſeeds of water Creſſes, and of Rocket powdered and mingled together, of each ℥j.

5. *Diſtilled Waters.*

Diſtilled Waters becauſe they are a neat and pleaſant Remedy, fill almoſt every Page among the anti-ſcorbutick preſcripts: Some diſpenſations of theſe eſteemed very profitable and fit, are in our *Pharmacopœa*; as the compound water of Radiſhes, and the mngiſterial of Earthworms and of Snails. Beſides, there are extant very famous preſcriptions of theſe ſorts of Waters, delivered by *Quercetan*, *Dorncellius*, *Sennertus*, *Doringius*, and other Authors. Moreover every Phyſician is ready to preſcribe as occaſion ſerves, ſuch like appropriate to the condition of every ſick Body; for the anti-ſcorbutick Ingredients and others added, which may reſpect particular Diſtempers being received, and being cut, ſliced, and bruiſed, are put into ſome convenient Liquor, to wit, Whitewine, Cyder, or the Whey of Milk made by either of them; then let the whole mixture be diſtilled in a Cucurbit or in a Roſe Still: We will here ſubjoyn one or two forms uſed by us.

Take of the leaves of both the Scurvygraſſes, of Brooklime, of water Creſſes, and the tops of Broom of each *m* iiij, of the leaves of Germander and *Chamepitys* or ground Pine each *m* ij, of the Roots of Horſe-radiſh ℔ſs, of Aron, Angelica, *Imperatoria* or Maſter-wort each ℥iiij, the outer peels of 4 Oranges and of as many Limons, of the Roots of *Calamus aromaticus* ℥j, of Cinnamon, Cloves, each ℥ſs, being bruiſed and cut pour to them of the beſt Cyder, ℔viij, let them digeſt for two days in a glazed pot cloſe ſhut, then let them be diſtilled in a common Still, the firſt and laſt water being drawn off let them be mixed together.

In Winter time when green herbs are not to be had, we preſcribe after this manner: Take of the leaves of Scurvygraſs *m* iiij, the tops of Broom, Pinetree, and Juniper, of each *m* ij, the middle bark of the Elder Tree and of the Aſh Tree each ℥iij, of the Roots of Horſe-radiſh and of *Polypody* of the Oak, each ℥iij, the rinds of 4 Oranges and of as many Limons, of Winteran Bark ℥iiij, being cut and bruiſed put them into 8 pints of Whitewine or Cyder, or the Whey made of either of them, and let them be diſtilled.

The ſimple water of the leaves of Aron being diſtilled in the Spring time, is an efficacious Remedy againſt the Scurvy, if it be taken to the quantity of 3 or 4 ounces twice aday with ſome other Medicine.

The ſimple water of Scurvygraſs being poured upon freſh leaves bruiſed and diſtilled and ſo often reitterated with new cohobations, becomes an effectual Remedy: Moreover, the ſtrong Spirit of Scurvygraſs is prepared after this manner. Take of the leaves of Scurvygraſs as much as will ſuffice, being bruiſed let them be made up into Balls ſuch as thoſe of Woad which the Dyers uſe, then pour upon thoſe Balls being put into a well glazed Pot, either as much of the water of Scurvygraſs or of Wine of the ſame herb, as will cover them at leaſt 4 fingers, and let them be kept exactly ſhut for 3 or 4 dayes in ſome cool place, then let the whole matter, being put into an Alembeck be diſtilled: Let the diſtilled water, being put into a Cucurbit, be rectified, at firſt there goes forth the ſtrong Spirit, of which may be taken in a fit Vehicle from 15 to 20 drops.

6. *Anti-ſcorbutick Wine and Ale.*

I was wont to prepare ſimple anti-ſcorbutick Wine of excellent uſe, after this manner in the Spring or Summer time. Take of the leaves of Scurvygraſs gathered in a clear day as much as you pleaſe, being bruiſed and the Juice preſſed forth, fill a Veſſel of 3 or 4 Gallons with it, and putting thereto 1 or 2 ſpoonfuls of Yeaſt, let it ſtand to ferment for two days; then the Veſſel being cloſe ſhut let it be put into a Wine Cellar for 6 months, then the Liquor being clear and of colour like Spaniſh Wine,

Wine, draw it forth into Bottles and keep it for uſe: It may be kept good and incorrupt for many years, the doſe ℥ij or iiij twice in a day. PHAR. Part. II.

Medicated Wines, of which may be taken 4, 3, or 2 ounces at medical hours daily, as alſo at Meals, are prepared after this manner: Take of Scurvygraſs leaves *m* iiij, ſhavings of wild Radiſhes ℥iiij, of Winteran Bark ℥ſs, of the outer rind of 4 Oranges and of as many Limons, and let them be put into a glaſs with 12 pints of White-wine, Rheniſh, or thinner Spaniſh Wine: The Veſſel being cloſe ſhut up let it be kept in a cold place, and as often as you need, draw the Wine off clear.

It is a uſual thing to preſcribe for ſcorbutical perſons, medicated Ale or Beer to be drunk conſtantly for their ordinary drink: Let Ale or Beer be prepared as much as will fill a 4 Gallon Veſſel, and inſtead of Hops boyl therein of the tops of the Pine or the Firr-tree *m* iij, and after it hath fermented in the Veſſel, let there be put to it of the leaves of Scurvygraſs *m* iij, of the roots of ſharp pointed Docks prepared ℥iiij, the rinds of 4 Oranges, and after it hath ſtood 7 days drink of it.

Theſe ſort of medicated Ales may be prepared with other ingredients, according to the affection or temperament of the Patient, by which kind of Remedy the medicinal Particles altering the dyſcraſie of the Blood, being continually carried into its Maſs together with the Aliments, many have found much benefit in taking away the cauſe of the Scurvy. But for as much as we have ſhewn the cauſe of this, even as the *ſpecies* of the Diſeaſe to be two fold, and that hitherto the Medicines propoſed, reſpect only the ſaline ſulphureous intemperature of the Blood: In the next place it behoves us to add ſcorbutick Medicines, which are convenient in the other, *viz.* in the ſulphureous-ſaline dyſcraſie of the Blood.

CHAP. VIII.

Of Medicines of every one of the aforeſaid Forms reſpecting the Scurvy, being excited in a more hot Conſtitution, and ſulphureous-ſaline Dyſcraſie of the Blood.

IN ſome ſcorbutical perſons, the uſing much of the aforeſaid ſharp things, as Scurvygraſs, Horſe-radiſh, Winteran Bark, and others endued very much with a volatile ſalt, hath been found hurtful: Wherefore in ſuch like caſes where the morbifick cauſe conſiſts in a more hot dyſcraſie of the Blood, like to ropy wine, temperate Medicines leſs agitating the particles of the humors, apt to grow hot of themſelves are preſcribed: Wherefore we will here add the forms in the ſame order as the former, and firſt we will begin with the ſolid Remedies.

Electuaries.

Take of Conſerves of Brooklime, Cardamines, made with an equal part of Sugar, of each ℥iij, of the *ſpecies* of *Diatrion ſantalon*, and of *Diorrodon Abbatis* each ℥j, of the powder of Ivory ℥j, of Pearls ℥ſs, of the ſalt of Wormwood and of Tamariſk each ℥j, and as much as will ſuffice of the Syrup of Coral, make an Electuary.

Take of the Conſerves of wood Sorrel, and of Cynorrhodon or of Hyps each ℥iij, (or of the Conſerves of ſharp pointed Docks, and of the roots of Succory each ℥iij) of the troches of Rhubarb ℥ij, of the *ſpecies* of *Diamargarit. frigid.* ℥iſs, of Tamariſk Bark ℥j, of *Sal Prunellæ* ℥iſs, preſerv'd *Myrobalans* 2, and with what will ſuffice of the Syrup of preſerv'd *Myrobalans*, make an Electuary.

For the Poor I was wont to preſcribe this more ready Medicine. Take of the Leaves of Brook-lime ℥vj, of wood Sorrel ℥ij, of white Sugar ℥viij, let them be bruiſed and beaten together, by adding to it of the Flower of ſweet Fenil Seeds ℥ſs, of the Powder of Ivory ℥ij, of *Sal Prunellæ* ℥jſs, with what will ſuffice of the Syrup of the Juice of Brooklime, make an Electuary.

Confections,

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Confections.

Take of the Powder of China Root, and of the Male Pæony, each ʒj, of which and yellow Sanders, each ʒiij, of Ivory ʒjſs, of Pearls ʒſs. of Crabs Eyes ʒj, of Coral being ſteeped in the Juice of Oranges, and ground on a Marble ʒij, of the whiteſt Tartar ʒjſs, of white Sugar ℥vj, diſſolved in as much water of *Scordium* compound as will ſuffice. Make a Confection.

Take of the candied Eryngo Roots, and of Scorzonere, each ℥ij, of the Powder of Aron Compound ℥ſs, of the Species of *Diatrion Santal.* ʒij, of *Sal Prunella* ʒj, with what will ſuffice of the Syrup of Cloves. Make a Confection.

Powders.

Take of the Powder of the Leaves of *Chamepitys*, and of Aron Compounded, each ʒjſs, of Ivory Powder, of red Coral prepared with the Juice of Oranges, each ʒij, of the Orange Tablets ʒij, mingle them and make a Powder, doſe 1 Spoonful twice in a day.

Pills.

Take of the Species of *Diatrion Santal.* of *Diamargarit. Frigid.* each ʒij, of the Seeds of Citron and of *Carduus* bruiſed, each ʒjſs, of the Roots of Cretian Ditany, and of the male Pæony, each ʒjſs, of the Salt of Tamarisk ʒij, with what will ſuffice, of the Gelly of Harts-Horn or Snakes Skins, make a Maſs.

Tablets.

Take of *Species Diatrion Santalon*, of *Diamargarit. Frigid.* of each ʒjſs, of Perls powdered, of red Coral prepared, of Powder of Ivory, each ʒj, of Sugar ℥vj, diſſolved in Water of *Scordium*, and boyled up to a Conſiſtence, make Tablets as before.

If that with theſe ſort of temperate Antiſcorbuticks, there ſhall be any need of the uſe of Steel, let there be added to the Electuary or the Confection, or alſo to the Maſs of Pills, of the Magiſterium of Steel of *Mynſycthus*, or of the extract of Steel of our preparation ʒij: In ſome caſes of *Crocus Martis* about ʒijſs or ʒiij may be added to the like Compoſition: But it ſeems better to give the Chalybeates in the Liquors to be drunk after the ſolid Medicines, than to put them into the aforeſaid Compoſitions. It remains now that we preſcribe the forms of the Liquors.

Decoctions.

In the Scurvy excited after a long continued Feaver, theſe ſorts of Decoctions are given with benefit, which may purifie the Blood and plentifully move Urine.

Take of the Roots of Chervil, Scorzonera, Sorrel, Parſely, of each ℥j, of the Leaves of Agrimony, and Harts Tongue, each *m*j, of Harts Horn burnt ʒij, of the Rinds of 3 Apples, of Corinthian Grapes ℥ij, of Liquoris ʒiij, let them be boyled in 4 Pints of Spring Water till the third part be conſumed, add to it of *Sal Prunella* ʒij, or ʒiij. The doſe ℥vj, twice or thrice in a day.

Take of preſerved Eringo Roots ʒvj, of Graſs Roots ʒij, of the Leaves of Gooſe-graſs or Cleavers, *m*ij, of Agrimony and of Liver-wort, each *m*j, of Raiſins of the Sun, ℥ij, of white Sanders ʒj, of Liquoriſh ʒij, let them be boyled in 4 Pints of Spring Water, to the Conſumption of the third part. The doſe ʒvj, after a ſolid Medicine.

For Country, and the poorer ſort of People, that they might not fall into the Scurvy after a Feaver, I was wont to preſcribe that they ſhould take twice aday this following draught, *viz.* Take of the Rotts and Leaves of Dandelyon *m*iſs, let them be boyled in a Pint and half of Poſſet Drink till the third part be conſumed: let it be ſtrained and ſerve for two doſes.

Or take of the Roots of Dandelyon *m*ſs, of Citron and *Carduus* Seeds, each ʒj, let them be boyled in a Pint and half of Poſſet drink made of Apples or Cyder till the third part be conſumed.

Infuſions.

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Infuſions.

The Apozems but now preſcribed become more powerful againſt the Scurvy, if being prepared without Liquoris, they be ſtrained into a Jugg, into which let there be put of the Leaves of Brook-lime and of water Creſſes or Cardamines, each *m*j, then make an Infuſion warm, and cloſe ſhut for 6 Hours. The Liquor at laſt being ſtrained, let it be kept in cloſe Veſſels. The doſe ℥vj twice or thrice in a day. Alſo make an Infuſion of Whey boyled with the Roots of Dandelyon, or the Leaves of Fumitory ſtrained into a Veſſel with one handful of the Leaves of Brook-lime, and as much of Celandine the leſſer.

Chalybeate Infuſions are wont to be of frequent Uſe, to wit, of the Salt of Steel, or of the Magiſtery or Extract put into ſome Decoction or diſtilled Water; but as the natural Water or Spaws, ſo alſo the Artificial, of our preparation of Steel diſſolved in Spring Water, and impregnated with the Infuſion of Antiſcorbuticks, hath been drunk with very notable Benefit.

Juices and Expreſſions.

Take of the Leaves of Brook-lime, of water Creſſes, each *m*iiij, of wood Sorrel *m*ij, being bruiſed let the Juice be wrung forth, and let it purifie in a Glaſs cloſe ſhut, which it will ſoon do. The doſe is ℥iſs, to 7 Ounces in a convenient Vehicle.

Take of the Leaves of Brooklime *m*iiij, of the Branches or ſtrings of Engliſh Rhubarb *m*ij, being bruiſed let the Juice be preſſed forth.

Take of the Leaves of Brooklime, of Creſſes, of Cardamines, of the leſſer Celandine, of wood Sorrel, each *m*ij, being bruiſed let the Juice be preſſed forth, add to it a fourth part of the Juice of Oranges: Let it be kept in a Glaſs.

Syrups.

As often as there is any need of Syrup for any other Compoſition, we make uſe of either the Compound Syrup of the Juice of wood Sorrel, or of Fumitory, or of Coral; or alſo a Magiſtral of the Juice of Brooklime may be prepared after the ſame manner, as we before preſcribed concerning the Juice of Scurvygraſs.

Diſtilled Waters.

Diſtilled Waters more temperate are prepared, either by changing the ingredients, or the *Menſtruum*, or both.

As to the firſt, proceed after this manner. Take of the Leaves of Brooklime, Garden Creſſes, Fumitory, Harts Tongue, Liverwort, Baum, the tops of Tamarisk and Cyprus, of each ℥ſs, of the Roots of ſharp pointed Docks, of the Polypody of the Oak, each ℥ij, of the outward Bark of four Oranges, of cleanſed Snails ℔ij, being cut and bruiſed pour on them of Whey made of Syder, ℔vj, let them be diſtilled in a common Diſtillatory.

2. As the *Menſtruum* is more weak, let the Ingredients be moderately hot.

Take of the Leaves of Scurvygraſs, of Brook-lime, of Water and Garden Creſſes, each *m*iij, the Rinds of 4 Oranges, a pint of Snails, being all cut ſmall, pour to them of the common Whey of Milk, or freſh Milk ℔vj. Let them be diſtilled in the ordinary way.

3. In the Scorbutick Atrophie and Tabid Diſpoſition, where no hot thing agitating the Blood, Spirits and Humours ought to be admitted; both the Ingredients and the *Menſtruum* ought to be temperate, and ſweetning the Blood.

Take of the Leaves of Brooklime, of Cardamines, Harts Tongue, Maiden Hair, Liverwort, Betony, Agrimony, of each *m*ij, of Snails cleanſed ℔iſs, (or the ſoft fleſh of a Capon, or the Heart of a Sheep cut to pieces) being all ſcalded and cut, let them be bruiſed together, and then pour to them ſix Pints of freſh Milk (or Fumitory Water) and let it be diſtilled after the ordinary way.

Medicated Wines and Ale.

Although the uſe of Wines ſeems to be leſs agreeable in the Scurvy, excited by reaſon of heat, or the Sulphureous-Saline Dyſcraſie of the Blood, yet when either the

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Stomach is more weak, or that by long cuſtom, they at leaſt require drink of Wine mixed with a little Water; the ſame ſort of Liquor ought to be prepared, both more temperate and alſo medicated. And firſt of all may be granted them ſmall Wines diluted with Water, and impregnated with the Infuſion of Baum, Borage, or of Pimperinel or Burnet, or others.

Moreover Wines are prepared of the Juice of Currans, Raſps, Cherries, and of other Garden Fruit, which being ripened by fermentation become very grateful to the Stomach, and purifie the Blood; Then Cyder, the familiar and almoſt genuine Wine of our Country, ſo it be clear, ſweet, ſoft, and without any ſharpneſs, helps very much in the Scurvy. Beſides to this Liquor, being freed from its Fæces, and put up into little Veſſels, may be put ingredients of various natures or kinds; *viz.* of which ſort are the tops of Pine or Fir-tree, the Flowers of Tamarisk, alſo the ſhavings of Harts-Horn, or Ivory, which will ſweeten the Liquor and preſerve it from growing ſour; for as much as the Particles of the fluid Salt abounding in that Cyder, being apt to cauſe it to grow ſour of it ſelf, are hindered by diſſolving the foreſaid Ingredients.

The more temperate medicated Ale or Beer, is preſcribed after this manner, *viz.* let there be Ale prepared to fill a ſmall Veſſel, holding 5 or 6 Gallons, in which inſtead of Hops, let there be boyled the tops of Pine or Firr Tree, or of Tamarisk, or the ſhavings of any of their Woods, then after it hath worked, put into the Veſſel the Roots of ſharp-pointed Docks dryed, (than which certainly there is not a more helpful remedy in the Scurvy) to theſe ſometimes may be added the Leaves of Brook-lime, Water-creſſes, Barberries, and alſo Orenges and Limons ſliced may be put into the Veſſel.

The Leaves of Harts Tongue, put into the Veſſel of ſmall Ale, after fermentation, gives it a moſt grateful taſt and ſmell.

CHAP. IX.

Of the Curatory Indication of the Scurvy, by which help is afforded to the Diſeaſe it ſelf, and to the Symptoms chiefly afflicting.

WE have hitherto treated concerning the Cure of the Scurvy, and ſhewed what belongs to the preſervatory indication, to wit, the taking away of the morbifick cauſe, *viz.* both the intentions of healing and manifeſt Remedies. Which kind of method being timely entred upon and rightly inſtituted, oftentimes performs the whole buſineſs, for that the cauſe of the ſickneſs or the Root being cut off, the diſtempers depending upon it wither away of their own accord. But yet we may not always follow this courſe directly, but ſometimes ſtepping of one ſide, go another way to work, becauſe ſometimes more grievous accidents and ſymptoms happen, which require peculiar and as it were extraordinary help of Medicine, which ought to be attended upon immediately, and the general Cure often interrupted: As to this it is to be obſerved, that when the diſtempers which follow upon the Scurvy, require proper Remedies according to the nature of every one of them, and the diſpoſition of the Patient, yet there ought always to be mixed with theſe Anti-ſcorbuticks. There will be no need to inſtitute a curatory method, againſt all the diſeaſes and diſtempers with which the Scurvy is wont to environ one, for ſo I might tranſcribe the whole practice of Medicine, but we ſhall have regard only to the ſymptoms chiefly afflicting, by which either the life of the Patient is endangered, or the principal Cure is hindred: By what means and with what Medicines ſuch may be cured, we ſhall now ſhew.

Of the Curing difficult Reſpiration and Aſthmatical Paroxyſms,

Difficult breathing with ſtraitneſs of the Breaſt and aſthmatical fits, ought to be taken away by appropriate Remedies, and to be preſcribed beſides the general method, otherwiſe the ſick may be ſoon brought into danger of life. As theſe kinds of evils ariſe for the moſt part in ſcorbutical perſons, by the vice of the Blood ſtagnating in the heart, or by reaſon of the pneumonick Nerves, being hindred in their function, ſo they are to be cured with Cardiacks or anti-ſpaſmodick Medicines, *viz.*

of

of Hartshorn, Soot, Blood, of mens Skuls, alſo the tincture of *Caſtor*, Antimony, or of Sulphur, the flowers of *Sal Armoniac*, the flowers of Benjamin, alſo *Elixir Proprietatis*, in theſe caſes are of excellent uſe: Which kind of Remedies may be given at every turn, with a doſe of ſome anti-ſcorbutick Liquor, proper alſo againſt the aforeſaid diſtemper. For the ſudden allaying of difficult breathing, merely ſpaſmodical when it afflicts very ſore, I never found a more ready Remedy than 10 or 12 drops of our tincture of opiate *Laudanum*, being given in ſome convenient Liquor, for that ſleep creeping on, the Spirits remit their inordinations, and being in the interim refreſhed, they reſume afterwards their priſtine task after a due manner. The more ſharp Clyſters which very much cleanſe the Belly, alſo ſudorifick Decoctions and Diureticks often give help. PHAR. Part. II.

Take of the Roots of Bur-Docks, of Butter-Bur, Chervil, each ℥j, of the leaves of Maiden hair and *Germander* each *m* i, of Bur-Dock and baſtard Saffron ſeeds each ʒiij, of Raiſins ℥ij, being cut and bruiſed let them be boyled in Spring water ℔iij, to the conſumption of the third part, add of Whitewine ℥iiij, let it be ſtrained into a Jug, to which put of the leaves of Scurvygraſs cut *m* j, of the roots of candied *Enula Campane*, and cut ſmall ℥ſs, let them infuſe hot and cloſe ſhut for three hours: The doſe ℥vj twice or thrice a day.

Of the Diſtempers of the Ventricle, that are wont to follow upon the Scurvy.

Sometimes ſcorbutical People are wont to be cruelly tormented with great pain and fulneſs of the Ventricle, alſo with a nauſeouſneſs and belchings, and ſometimes alſo with cruel and frequent vomiting. Which kind of vices ariſe ſometimes from the Chyle, being there degenerated into a putrefying humour, but more often from the morbifick matter being carried away, either by the paſſage of the Blood or the nervous Juice, and depoſited either in the cavity of the Stomach, or fixed in the nervous folds and membranes. In theſe caſes if a viſcid or ropy ſtinking matter, or otherways hurtful be caſt out by vomiting, and that it be ſuſpected that the cauſe remains within the cavity of the Ventricle, a gentle Vomit of wine of Squills, or of vitriol Salt, will be convenient to be taken: Or if the peccant humour diſturbs the Belly, either an extract of Rhubarb or an infuſion of it, the Salt or Cream of Tartar being added. But if the matter ſticks cloſely within the Membranes or nervous foldings, Diaphoreticks, or things reſtraining the effervencies of the Salts rather help: *Elixir Proprietatis*, or the flowers of *Sal Armoniac*, or the Spirits of Soot may be taken by turns, with the water of Rhadiſhes compound, or of Snails, or any other anti-ſcorbutick Liquor. In the mean time, once or twice in a day there may be applied to the region of the Stomach, a fomentation of Wormwood, Centaury, Camomil Flowers, the Roots of Gentian and others, boyled in White-wine, with woollen Stuphs dipt in it and wrung out very hot. The uſe of Clyſters is convenient, and not ſeldom Opiates yield great help.

Of the Pain of the Belly and Scorbutick Colick.

There is almoſt no Diſtemper requires the ſpeedy help of Medicine more than the Colick and torments of the Belly, which frequently happen in the Scurvy. Againſt theſe evils, Clyſters of ſeveral ſorts, Fomentations, Liniments, and Cataplaſms are adminiſtred. Here the uſe of Opiates are thought to be very neceſſary, certainly in this caſe that preſcript of *Riverius*, that purging Pills ſhould be adminiſtred with ſome *Laudanum* mixed with them, may take place; for by ſleep being moved, and a plentiful ſolution of the Belly being cauſed, very often the fits are taken away: But the powders of Shell-fiſh, by which the acetoſous Salts are imbibed or fixed, conduce very much to the profligating or driving away the morbifick cauſe. As for example, take of the powder of Crabs eyes, and of Egg ſhells each ʒiſs, of Pearls ʒi, make a powder, let it be divided into 12 doſes, let one of which be taken every ſixth hour, with ſcorbutick water, or with the decoction of the Seeds and Roots of Burdocks, as is above deſcribed, or elſe with poſſet drink, in which is boyled the Roots and ſeeds of Burdocks, the leaves of ſweet Marjoram, and Saxifrage, and the leaves of Scurvygraſs infuſed. In the ſcorbutick Colick, alſo in the diſtempers of the Ventricle, but now deſcribed; the uſe of *Epſom* and *Barnet* purging waters or the like, affords oftentimes very great benefit.

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Of the Lask and Dyſenterical Diſtempers.

An inveterate *Diarrhœa* ſuch as often happens to ſcorbutical perſons, ought in no wiſe to be ſtopped with aſtringent Medicines, nor is it eaſily cured by alteratives or every Anti-ſcorbutick: Purging waters impregnated with iron or vitriol are the beſt Medicines for this diſtemper: Next to theſe are the artificial ſpaws or chalybeate Medicines, which are wont to give notable help. *Crocus Martis* rightly prepared is to be preferred to all others, I have uſed the following method with good ſucceſs: Firſt a Purge of the powder or the infuſion of Rhubarb is to be inſtituted, with aſtringent Spices added, and often to be repeated every three or four days. In the other days, let a doſe of the following Electuary of the bigneſs of a Nutmeg be taken in the morning, and at 4 a Clock afternoon. Take of the Conſerves of common Wormwood made with an equal part of Sugar ℥vj, (in a more hot conſtitution, inſtead of this let Conſerves of red Roſes be taken) *ſpecies Diarrhodon Abbatis* ʒij, of the powder of white and red Sanders each ʒj, of *Crocus Martis* the beſt ℥ß, with what will ſuffice of the Syrup of Steel, make an Electuary.

In dyſenterical diſtempers or a *Tenaſmus* or deſire of going to Stool, you muſt proceed after the like method; if it may be had, let the uſe of purging waters be inſtituted, beſides let often Clyſters Prepared of vulnerary decoctions be uſed. Lately I cured one greatly labouring with a tedious dyſentery, who had for a long while voided by Stool many ounces of Blood, by this Medicine. Take of the beſt Rhubarb in powder ʒi, of the powder of red Sanders ʒii, of Cinnamon ʒi, of *Crocus Martis* ʒiij, of *Lucatella*'s Balſom what will ſuffice to make a pilulary Maſs, he took 4 Pills ſometimes every day and ſometimes every other day for a week, and was perfectly cured. I alſo preſcribed him to drink medicated Ale conſtantly, with the roots of ſharp pointed Docks, and the leaves of Brooklime infuſed in it.

Of the Vertigo *and fainting of the Spirits, and other Diſtempers, that are wont to be joyned to the ſame ſcorbutical Affection.*

The *Vertigo* often comes upon an inveterate Scurvy, to which is wont to be added a fainting or frequent ſinking of the Spirits and almoſt a continual fear or dread of it, alſo a *ſtupor* or ſtiffneſs in the members, and a ſenſe of tingling or pricking here and there running about them, which kind of diſtempers proceed from the failure of the animal Spirits in the fountain it ſelf, and ſometimes of thoſe within the Nerves, both the Cardiack and thoſe ſerving for the motion of the Members; and when they depend on the Brain and nervous ſtock, being beſet very much with the ſcorbutick Salt, they are not eaſily cured. Cephalick Remedies, ſuch as are convenient in the *Vertigo* and paralytick Diſeaſes excited by themſelves, are to be adminiſtred with anti-ſcorbuticks mixed therewith: Therefore firſt of all a proviſion of the whole being made by fit Catharticks, and ſuch as are convenient in the Scurvy, you may proceed with appropriate Remedies againſt the ſaid Diſeaſe after this manner.

About the beginning of the Cure, let there Blood be taken from the veins of the Fundament by Leeches, and unleſs any thing may contradict, let it be at ſeveral times repeated.

Take of the powder of the male Peony root ℥ß, of red Coral prepared ʒij, of an humane Skull and of Elks Claws each ʒi.

Take of the beſt Sugar diſſolved in the compound Peony water, or in the water of wild Radiſh, and boyled up to a conſiſtence ℥viii, of the beſt oyl of Amber rectified ℥ß, make thereof Tablets, and take of them from ʒiß to ʒii morning and evening, drinking after it a draught of the following diſtilled Water.

Take of the leaves of Scurvygraſs, of Brooklime, of Creſſes of the Garden, of the Lillies of the Valley, of Sage, Roſemary, and Betony, each *m* iii, of green Walnuts ℔vi, of the rinds of 6 Oranges and of 4 Limons, of the freſh roots of the male Peony ℔iß, being bruiſed and cut, let there be put to them of the phlegm of Vitriol ℔j, of Whey made with Cyder ℔v, let them be diſtilled after the ordinary way, and let the whole water be mixed together: The doſe ʒiij, to ʒiiij.

Of Hæmorrhagies or Fluxes of Blood.

Great fluxes of Blood very often threaten great danger in the ſcorbutick diſtemper, in ſo much as the ſick are given over, for that reaſon to ſudden death, whilſt the

the Blood breaks forth now from the Noſe, now by the menſtrual Flux or at the hæmorrhoidal veins, even to the fainting away of the Spirits or ſwooning: Beſides that ſometimes being caſt out from the Lungs or Ventricle, gives a ſuſpition of an Ulcer lying hid, or at leaſt a great debility in the affected part: Wherefore if theſe bloody excretions are immoderate, or happen in an inconvenient place, they ought for the preſent to be ſtopped, and prevented for the time to come.

For the ſtaying of the Blood when it breaks forth immoderately, the method is commonly known, and there is nothing more to be done or particular in this diſtemper by reaſon of the Scurvy, than when excited upon other occaſions: But as to the preventing Hemorrhagies, Remedies, which take away the acrimony of the Blood, and bind up the mouths of the Veſſels being too looſe and gaping, are to be adminiſtred, either intention is beſt performed by Chalybeate Medicines. The uſe of vitriolick Spaws is very fit in this buſineſs, beſide the infuſions of Steel, Extracts, Salt, and ſuch kind of preparations which chiefly contain the ſaline or vitriolick nature of the Iron, are alway moſt profitable againſt Hæmorrhagies: by what means Iron and its preparations, produce theſe effects and ſeveral others in the humane body, we have ſhown already.

Take of the Conſerves of red Roſes, of Cynorrhodon or of Hipps each ℥iij, of the *ſpecies Diarrhodon Abbatis*, and *Diatrion Santalon* each ʒjſs, of the ſalt of Steel ʒj, of the beſt *Crocus martis* prepared ʒji, of red Coral prepared ʒiſs, with what will ſuffice of the Syrup of Steel, make an Electuary: Let the quantity of a Nutmeg be taken thrice in a day, drinking after it a draught of ſome proper Liquor.

For poor people I am wont to preſcribe after this manner, Take of the tops of Cypreſs, of ſtinging Nettles each ℥iiij, of Brooklime ℥ij, let them be pounded in a Mortar with ℥x of white Sugar, then add the thin ſhalings of Iron finely powdered ℥i, of the Powder of white and red Sanders each ʒij, with what will ſuffice of the Syrup of Nettle juice, make an Electuary: The doſe the quantity of a Walnut twice a day.

Take of diſtilled water, or of a temperate anti-ſcorbutick Decoction ℔ij, of our Steel prepared ʒij, mingle it in a glaſs: The doſe from 3 to 4 Ounces.

Take of the tops of ſtinging Nettles, of Brooklime each *m* iiij, being bruiſed let the juice be preſſed forth and kept in a Glaſs, the doſe ℥ij or ℥iij twice a day, with diſtilled anti-ſcorbutick Water.

Of the Vices of the Mouth coming of the Scurvy.

As ſoon as the ſcorbutick Taint ſeiſes on the parts of the Mouth, ſo that the Gums begin to ſwell, and their fleſh to become ſpungy, preſently Remedies which may drive away putrefaction from them, are carefully to be adminiſtred: Among theſe, things to waſh the mouth and liniments are of chief uſe, whilſt the Diſeaſe is beginning about theſe parts, or growing grievous therein, which yet have reſpect to various intentions, and ſo are ſeverally to be prepared, *viz.* the fleſh of the Gums at firſt ſwelling up, are to be freed and dryed from the incurſions of the Corrupt and ſalt Blood or *Serum:* Afterwards their fleſh growing flaggy and falling from the Teeth, is to be defended from rottenneſs, and alſo that it may more ſtrictly embrace the Teeth, it is to be conſtrained or bound cloſer, far theſe and perhaps other intentions, Gargariſms or waters to waſh the mouth of ſeveral kinds are inſtituted: The chief Ingredients of which for the moſt part are boyled vegetables and infuſed Minerals. The Herbs or Roots which are boyled in ſome fit liquor, *viz.* Water or Wine are moſt commonly either ſharp, bitter, or ſtyptick or binding, and ſo theſe ſort of Decoctions are impregnated, either with a Volatile, Lixivial, Vitriolated, or chalybeated, or aluminous Salt, we will here ſhew you ſome forms of every kind of them.

1. When therefore the fleſh of the Gums begins firſt to ſwell up, and to become ſpungy by reaſon of the influx of a corrupt and ſalt Blood and *Serum*; take the middle bark of the Elder Tree and of the Elm each *m* ʒß, of the leaves of Savory, Sage, Hedg-muſtard, garden Creſſes, each *m* j, of the roots of Pellitory ʒij, being bruiſed and cut let them be boyled in ℔iij, of Lime water, to the conſumption of the third part: If a ſweetning be required, add of honey of Roſes ʒii, make a Gargal. Or take of Camphorated Vitriol ʒi, (commonly called by our Countrymen by the name of Captain *Green*'s Powder) a quart of Spring water, mingle them in a glaſs and ſhake them well together, and then the Liquor ſettling and growing clear, may be made uſe of. Or let there be prepared a Lye of the aſhes of Broom, or Roſemary, or of Nitre,

or

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of Tartar calcined, boyl in 3 pints of this, of the leaves of Savory, Thyme, Sage, Roſemary, each *m*j. when it is ſtrained put into it two handfuls of Scurvygraſs leaves, make an infuſion cloſe and warm for three hours, then let it be ſtrained again, and kept to waſh the mouth often in a day.

For the ſame intention alſo, Liniments may between whiles, and eſpecially at night be applied, that their virtues may be communicated to thoſe that are ſick, or while they are ſleeping. There is a preſcript very celebrious among Authors, and by long uſe confirmed. Take of the leaves of Columbine, of curled Mint, Sage, Nutmeg, Mirrh (which ſometimes may be omitted) of each ʒij, of burnt Allum ʒiß, of Virgin Hony ʒiiij, or what will ſuffice, make a Liniment according to Art.

2. When the Fleſh of the Gums growing flaggy, forſakes the Roots of the Teeth, ſometimes a light Scarification may be adminiſtred, beſides let the mouth be waſhed with this Decoction. Take of the tops of the Bryar, Cypreſs and Lady-ſmock Leaves, each *m*j, let them be boyled in three Pints of Water, in which Iron hath been quenched, to the Conſumption of the third part, to the ſtraining add of Hony roſat. ʒij, mingle them.

This kind of Liniment may be applyed. Take of the Powder of the *Florentine Oris*, of the Leaves of Sage and of St. *John*'s Wort, each ʒij, of bole Armenic, of *Sal Prunellæ*, each ʒj, of freſh Virgins Hony, as much as will ſuffice, let them be well incorporated, by working them together.

3. When the Gums begin to putrefy and corrupt, and alſo the Teeth, and the fleſh about them grow looſe and yield a noyſom Savour, more ſtrong Medicines and great reſiſters of Putrefaction are adminiſtred, here an infuſion of Vitriol Camphorated, alſo of the Medicinal Stone, have the chief place.

Or take of the Roots of Gentian, and of round Birthwort being cut, each ʒiß, of the Leaves of the leſſer Centaury, Pontick Wormwood, Savory, Columbine, each *m*j, let them be boyled in Lime water, or a Lie made of either Iron or Alum ℔iiij, to the conſumption of the third part. Add to the Colature of raw Hony ʒij or iij, mingle them.

4. If the falling out of the Teeth be chiefly feared, take of the Bark of the Roots of the Sloe Tree ʒj, of Tormentil and Biſtort whole, each *m*j. of the outer Rinds of Pomegranats, and the Flowers of the ſame, each ʒiß, let them be boyled in three Pints of Spring Water. Add to it when ſtrained, of Alum 2 or iij drams, of the beſt Hony ʒij, mingle them. Take of Vitriol Camphorate, of burnt Harts-horn, each ʒj, of Nutmeggs ʒiß, of the beſt Hony what will ſuffice, make a Liniment. Or take of the Powder of the Root of Biſtort, of the Rinds of Pomegranats, of bole Armenick, of burnt Allum, each ʒj, of Hony of Roſes what will ſuffice, add of the Spirit of Vitriol ʒj; make a Liniment.

5. If at any time (as ſometimes it is wont) that deep and putrid Ulcers eat into the Gums or other parts of the Mouth, the aforeſaid more ſtrong Remedies are often to be uſed. Beſides, let little raggs be often applyed to the affected place, ſteeped in Egyptian Oyntment diſſolved in the Spirit of Wine, or in an Infuſion of Sublimate, or of the medicinal Stone. In theſe caſes the Cure is to be left to a skilful Chirurgion.

Of the Pains that are wont to Infeſt the Leggs, and ſometimes other Limbs, Chiefly in the Night.

Againſt theſe Pains, for indeed they are ſometimes very bitter; beſides the general method of curing the Scurvy, Specifick Remedies, and things helping this Symptom are ordered. Therefore in ſuch a caſe, the means of Purgation being inſtituted, and Phlebotomy alſo (if there be need) celebrated, it is convenient to ſet upon the Diſeaſe with inward Phyſick, and outward Topicks.

As to the firſt, thoſe which move by Sweat and alſo by Urine, does often avail, for that they carry another way, the lixivial and ſour recrements of the Blood and nervous Juice, that are wont to be gathered together in the affected part: But chiefly thoſe things are to be adminiſtred, which may defend either Humour from its depraved nature, *viz.* both Saline and Sour: ſhelly Powders, Crabs Eyes, Jaws of Pikes, alſo Spirits, and Flowers of *Sal Armoniack*, Spirits of Blood, Tincture of Antimony and of Coral: Decoctions of the Roots and Seeds of Burdocks, *Chamepitys*, Germander, very much help. Which kind of Remedies are to be taken twice or thrice a day with Antiſcorbutick diſtilled Waters. Water diſtilled out of Horſedung, to which is added Scurvygraſs, Brooklime, Gout Ivy, and ſuch like, is ſometimes very profitable.

profitable. In the mean time Liniments, Fomentations, Cataplasms and such kind of Applications which allay Pains, are outwardly to be applyed.

Of the wandring Scorbutick Gout.

Eugalenus, *Wierus*, the *Campen* Physitian, and *Gregorius Horstius*, have wrot particularly of this distemper, said to be very frequent in the Northern Countries of *Belgia*. A certain Sign of which is manifested by putting alive Worm to the grieved place, for he is presently wont to leap off, twine himself about, bend himself round, to slide along, and to dye: which I have also often experimented on our Country-men. The reason of which Experiment (as it seems) is this: we have determined the cause of the Pain and Tumour stirred up in the affected part, to be for that the saline or Lixivial Fæculencies from the Blood, and the sour, from the nervous Juice, being deposited in the same place, do mutually ferment or grow hot, even as Spirits of Vitriol and Salt of Tartar, mingled by deliquium or melting: further from such a striving and agitation of dissimilar particles, as the Pain and Tumour are caused, so indeed very sharp, and as it were Corrosive *Effluvia's* plentifully evaporate, which kill the worm laid upon the grieved place, even as if he should be held over those Liquors boyling: Becaus of the effect of this Experiment, the cure of this Disease has been ordained by Worms, to wit, Remedies prepared of them; but I know not whether being taken inwardly, they so certainly destroy the Disease, as they being applyed outwardly, are destroyed by the Disease. Even as Worms, so also Snails, Hog-lice, or Sows, and other bloodless little animals, for that they abound in a volatile Salt, do often enough become an efficacious remedy.

Henry Petræus relates two remedies used against this Disease, in *Westphalia*. Take 9 Worms bruised together, with two spoonfuls of Wine in a Mortar, and wrung out hard through a woollen Cloth, to these add half a measure of Wine, and let it be taken 3 spoonfuls morning, noon and night, for several dayes. 2. Take two or three spriggs of Savin, two spoonfuls of Virgins Hony, let them be boyled in a measure of Wine, till two fingers breadth be wasted: let it be strained, and take of it 4 or 5 spoonfuls thrice in a day. A certain Vulgar Potion, a kin to the former Medicine is cited by *Horstius*, and called the Monasterie Potion: Take of Sage, Betony, Rue, of each 5 Leaves, of earth-Worms, every one with red rings about their Necks, number 5, a little Savin, of Devils-bit Roots 2, let them be bruised with Water of Elder Flowers, and the Juice being pressed forth, let it be given to move Sweat. Also the like Prescript is proposed by the *Campen* Physitian in *Forestus*.

Certainly in this distemper the Magisterial Water of Earthworms, prescribed in the London Dispensatory, is extreamly convenient. I have often given also with good success, the Spirits and Salts of Hart's-horn, the Spirit of Blood, and the Flowers of *Sal Armoniack*. Besides the shelly Powders, as of Crabs Eyes, Corals, Perls and Vegetables, which have in them Antidotes for the Gout, as the Roots of Birthwort, the Leaves of Groundpine, Germander, and the like joyned with Antiscorbuticks, conduce to the cure of this Disease. Outwardly, for the allaying of the Pains, besides Anodynes, things under the form of a Liniment, Fomentation or Cataplasm, are made use of: The Oyl of Earth-worms, Froggs, and Toads, are often very profitable. I was told by a very signal Person much obnoxious to this Disease, that the Water of the Contents, taken from the Ventricle of an Ox newly killed, and drawn off clear by distillation, and with Raggs dipt in it warm, and applyed for a Fomentation, brings certain help.

Of the Convulsive and Paralytick Distempers that are wont to come upon the Scurvy.

When at any time the scorbutick Taint breaking in upon the Brain and Nervous Stock, doth greatly infect the moistning Liquor of either Province, for that reason indeed, several Diseases, and chiefly the Paralytick and spasmodick, or cramplike distempers (as we have already shown) are wont to arise: even according as the morbifick matter, being carried to the Animal Kingdom, shall be either narcotick or explosive. Although these kinds of Distempers shall be accounted in this case Symptomatical, yet they being very grievous, do challenge for themselves both the name and the greater part of the Cure, before their parent the Scurvy; so that the Sick is said rather to labour with the Palsy, or the Convulsion, then with the Scurvy, and also Medicines proper for those distempers, are at the same time proposed, with the others requisite to other intentions.

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For the curing thoſe Diſtempers coming upon the Scurvy, that chiefly muſt be performed, that the Remedies appropriate to them be rightly or conveniently applyed with Antiſcorbuticks. As to the Convulſive Diſeaſes, what I have made known in a former tract, may be eaſily transferred hither. But as to the Palſie, Lethargy, and many other diſtempers of the Brain, and nervous Stock, we intend ſhortly to make publick ſome ſpecial Diſquiſitions thereupon: In the mean time it is not fit, that we ſhould in this place foreſtal the therapeutick Method, which belongs to thoſe diſcourſes, but rather we will propoſe what may ſeem neceſſary at the end of this Work, the Caſes and Cures of ſome ſcorbutick Perſons, lying ſick alſo of thoſe Diſeaſes.

Of the Atrophy or waſting of the Fleſh: alſo of the Scorbutick Feaver, which oftentimes is either the Cauſe of it, or the accident, or effect of it.

There are three kinds of Cauſes, hanging by a certain Series, from one of which or more the ſcorbutick Atrophy without the Conſumption of the Lungs is wont to be produced, *viz.* either the Chyle is perverted by the default of the firſt paſſages, by which means it does not carry ſufficient or laudable proviſion to the Blood. Secondly, or being brought to it, yet by the fault of the Blood, it is not rightly changed into Blood and nutricious Juice. Or thirdly and laſtly, the nutricious Juice being prepared in the bloody Maſs, by reaſon of the fault of the nervous Liquor, is not rightly aſſimilated in the ſolid parts.

The Remedies appropriate to this Symptome reſpect either the emendation of the firſt paſſages, or of the aforeſaid Humours. As to the firſt, ſometimes it happens by reaſon of the Tone of the Stomach being broken, or its Ferment vitiated, ſo that it comes to paſs that the aliments put therein are not rightly dreſſed, but turn into an unprofitable Rottenneſs. To theſe ſort of evils, gentle Catharticks, digeſtives and ſtrengthners are to be adminiſtred. But more often the work of Chylification or of making the Chyle, is hindered by reaſon of a Schirrous Tumour, being excited now in the Ventricle, now in the Meſentery or in the circumjacent part. In this caſe opening and diſſolving things are convenient; and the uſe of Spaws or Purging Waters has bore away the Bell from all other remedies: Beſides Fomentations, Liniments, or Plaiſters, ought to be outwardly applyed.

Further, it ſometimes happens that without any Tumour ſtirred up in the *Viſcera*, the milky Veſſels being impacted by ſome thick and viſcous Matter, to be ſo much obſtructed, that the Proviſion of Chyle, though laudable enough and plentifully made, is not ſufficiently carried into the Blood. In this diſtemper, for the moſt part the Belly voides copiouſly white excrements like curdled Milk, and not like others dyed or ſtinking with Choler. The reaſon of which is, for that the impoveriſhed Blood more ſparingly begets the yellow bile, from which being poured into the Inteſtines, the colour and ſtink of the Excrements proceed. In this caſe the purging Spaws are convenient, and alſo with things opening, taken inwardly, Liniments, Fomentations, and Baths are uſed outwardly.

Againſt the *Maraſmus* or waſting of the Fleſh, ariſing from the fault of the Blood, degenerating from its Complexion, Aſſes or Cows Milk diluted with Water, or other proper Water diſtilled, often brings help. The broth of Snails or milk Meats, with them boyled in them; beſides diſtilled waters of Milk or Whey, with Snails and temperate antiſcorbutick Herbs mixed, help very much in this Caſe: alſo to this end, decoctions with Vulnerary and antiſcorbutick Herbs infuſed therein are taken with good ſucceſs: In the mean time Frictions to the external parts, with woollen cloathes made warm and dipped in reſumptive Oyntment, or the freſh Oyl of Walnuts, may be daily adminiſtred.

When the Atrophy ariſes from the Vice of the diſtempered Blood, perverting by that means the nutritious Juice, it hath moſt commonly joyned with it, an erratick Feaver with nightly ſweats, for that the ſanguinous Maſs is compelled to inequal and uncertain effervencies by that degenerate Juice; and that the ſo troubleſome matter is caſt out by the nightly Sweat. In this caſe a ſlender Diet being ordered, let them often take Decoctions and diſtilled waters, which fuſe and purifie the Blood, with antiſcorbuticks mixed therewith.

Take of the ſhavings of Ivory and of Hartshorn each ʒijſs, of *Eringo* Roots preſerved ʒvj, of the Roots of Chervil, Dandelyon, each ʒiſs, of the leaves of Harts Tongue and Liverwort each *m* j, one Apple cut, of Raiſins of the Sun *m* j, let them be boyled in Spring water ℔iiij, to the conſumption of the third part: Being ſtrained, put into it of the leaves of Brooklime bruiſed *m* ij, of *Sal Prunellæ* ʒiſs, or of fixed

Nitre

Nitre ʒj, make an infuſion warm and cloſe for 3 hours: Take of it iiij or ℥vj thrice in a day. PHAR. Part. II.

Take of the leaves of Brooklime ℔iiij, of Sorrel and Dandelyon whole each *m* ij, of Snails cleanſed ℔iij, the rinds of two Oranges: Being ſliced, cut, and beaten, pour to them of ſweet Milk or Whey made with Cyder, or of the Juice of freſh Apples ℔vj, let them be diſtilled after the ordinary way, take of it ℥iii twice or thrice in a day.

Of a Rheumatiſm.

This Diſtemper we have determined to proceed from the congreſſion and mutual effervencies of the Salts which are of a divers nature and generation, to wit, of the fixed coming from the Blood, and the acetous coming from the nervous Juice.

The ſubjects of either Salts are the ſuperfluous feculencies depoſited, and by the aforeſaid humours acted into certain turgeſcencies or riſings up, being ſpread abroad into the parts, now into theſe now into thoſe: Wherefore that the Diſeaſe may be cured, and the turgeſcencies of the humours allayed, both their ſuperfluous feculencies are to be purged forth, and alſo both the degenerate Salts of either order, are to be reduced and made volatile.

For the two former intentions, a light Purge and Phlebotomy are chiefly required, and ought to be often repeated according to the ſtrength of the Patient; alſo Diureticks and Diaphoreticks which may convey forth ſome way the Salt Seroſities, are next to be given: That theſe ſort of Evacuations may the better ſucceed leiſurely, with a good habit and nature aſſiſting, Opiates are often made uſe of: For the other ſcope on which the chief hinge of the cure doth turn, alteratives, and chiefly thoſe which are indued with a volatile Salt, do greatly help: Wherefore in this caſe it is a common, but not to be contemned Medicine, to drink twice or thrice a day 4 or 6 ounces of an Infuſion made of Stone-horſe dung, in ſmall Wine or Ale or in proper diſtilled water. But a Medicine a little more grateful, though not more efficacious may be prepared, if a water be diſtilled out of that Dung with anti-ſcorbutick Ingredients, infuſed in Whitewine or Cyder; which may be taken twice in a day from ʒiij to ʒiiij, I have often preſcribed in this caſe Spirit of Hartshorn, and of Blood, with very ſignal benefit to the ſick.

Of the Dropſie.

As we have determined that the Dropſie that is wont to ſucceed upon the Scurvy, is two fold, *viz.* habitual and occaſional, we ſhould utterly loſe our labour to ſpeak of the cure of the former; for in truth no Remedies can be able to reſtore the Liver, and the Lungs, and the other *Viſcera* ſometimes vitiated, and the complexion of the Blood wholly overthrown. In ſuch a caſe if any thing be thought fit to be done, the bounds of Medicine will be but narrow, for neither for Cathartick nor Diaphoreticks, nor for any other more ſtrong ſort of Evacuation, is there any place left: Therefore chiefly and indeed only Cordials and Diureticks muſt be inſiſted on. To theſe ends, *Elixirs*, Tinctures, Electuaries, Powders, Infuſions, Decoctions, diſtilled Waters, *&c.* which are partly againſt the Dropſie and partly againſt the Scurvy, are to be adminiſtred; but becauſe they ſignifie little we ſhall omit preſcribing their forms.

The ſcorbutical Dropſie ſuddenly excited from an evident or certain occaſion, as hath been ſhown, very often admits of a Cure, which that it might more eaſily ſucceed, firſt of all the tumults of Nature are to be quieted, and its inordinations to be ſuppreſſed: Wherefore if waking do very much infeſt, Sleep muſt be allured by the uſe of Opiates, and then it muſt be provoked as often as there is great need. As ſoon, as by reaſon of ſtrength, it may be lawful to purge, let the following Powder be taken, and a due ſpace being between let it be repeated, and in the interim let the Belly be kept ſoluble by frequent Clyſters. Take of *Mercurius Dulcis* ϑj, of the reſine of Jalap *gr.* v to 10, of Cloves ϑſs, mingle it, and let it be given in a ſpoonful of Watergrewel; at other times Diureticks and ſometimes Diaphoreticks are carefully to be taken. Take of the tincture of the ſalt of Tartar, impregnated with an infuſion of *Millepedes* or Hoglice as much as you will, let there be taken of it ϑj to ϑij twice in a day, with an appropriate Liquor.

Take of the Spirit of *Sal Armoniac* what you will, the doſe ϑſs to 15 drops after the ſame manner. Take of *Millepedes* prepared ʒiij, of the Salt of Tartar ʒij, of Nutmegs ʒj, mingle them and make a Powder: The doſe ϑſs twice in a day with a

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proper Liquor. Or take of Bees dryed and powdered ℥ij, of the powder of Ameos Seeds ℥i, of the oyl of Juniper ℈j, of Turpentine, what will ſuffice, make a Maſs of Pills: The doſe ℈j ℈ſs twice aday, drinking after it a ſpecifick Liquor.

Take of the leaves of either Scurvygraſs, of water Creſſes, Pepper wort, Arſeſinart, each *m* iij, of the Roots of Aron, Briony, of the Florentine Oris each ℥iiij, of the middle Bark of the Elder Tree *m* ij, of Winteran's Bark ℥ij, the outward rinds of 4 Oranges and of 3 Limons, of new Juniper Berries ℥iiij, being cut and bruiſed, put to it of Rheniſh Wine 3 pints, of Wine of the Juice of Elder Berries ℔ij, let them be diſtilled after the ordinray way, and let all the water be mixed together. Doſe ℥iij to ℥iiij twice in a day, after a doſe of any of the Medicines preſcribed before.

Let there be prepared Decoctions and medicated Ale, ſuch as hath been before deſcribed, adding thereto anti-dropical Ingredients.

Of the Crackling of the Bones.

There yet remains a ſymptom ſometimes, though rarely coming upon the Scurvy, *viz.* a crackling of the Bones, the cure and reaſon of which being omitted in the former Pathology, it will not be amiſs to ſpeak of it here. I have known ſome, but not above three or four, who whilſt they laboured with the Scurvy were troubled with its evil, not only in the humours and fleſhy parts, but at laſt alſo in the Bones themſelves, for as often as they bended any of their Members any way, the heads of the Bones as if they were naked, rubbing againſt one another made a great noiſe: Further, as they lay in bed and turned themſelves from one ſide to the other, a great noiſe from the colliſion of the *Vertebræ*, as if it were the ſhaking of a skeleton, was plainly heard, even affrighting thoſe ſo affected.

The Conjunct Cauſe of this perhaps may ſeem to be, that the ſoft *interſtitium* of the Bones, *viz.* the Fat, Membranes, and Ligaments, being greatly waſted, their junctures even as milſtones, being altogether emptied by reaſon of their mutual rubbing together, make a noiſe: But the matter is quite otherwiſe, becauſe thoſe that are greatly waſted away have not this crackling noiſe of the Bones, nor do thoſe who labour with this Diſtemper always waſte off their fleſh: Wherefore we rather ſay that the immediate cauſe of this ſymptom, is the dryneſs of the Bones or a defect of the *medulla* or marrow ſo properly called, which ought to be contained within the cavities of the Bones, and chiefly within their heads: For as certain Bones do include marrow or an unctuous humour every where ſhaken out, either from the great cavities or pores, and the ſmall paſſages, we have determined the uſe of this to be, that both the Bones being thus moiſtned, may become leſs brittle, and moreover, that this humour moiſtning the knobs of the Bones, may make ſlippery all the joyntings, even as Greaſe or Oyl the hinges of a Machine, and by what means facilitates their motion: Wherefore the heads of the Bones being deſtitute of this marrow, make a noiſe like to the wheel of a Cart that is ſeldom greas'd.

But if the procatartick or more remote cauſe be inquired into, *viz.* wherefore that unctuous liniment of the Joynts becomes defective; this indeed is to be imputed either to the vice of the Blood, as if it did not ſupply the Bones with aliment, participating equally with Sulphur and Salt, which truly ſeems unlikely, becauſe the bloudy Maſs alſo in ſcorbutical perſons, contains Particles of either of the aforeſaid kinds, and for that theſe labouring with the crackling of the Bones, have their Skin & Muſcles ſufficiently moiſtned with fatneſs: Or ſecondly and more likely, this unctuous humor by which the Joyntings are made ſlippery is wanting, through the fault of the Bones themſelves, *viz.* becauſe their pores and paſſages being ſo much obſtructed by ſome extraneous, and perhaps muddy matter, or tartareous carried thither by the Blood, that for that reaſon they cannot receive ſufficiently the Balſom deſtinated for them, nor ſend it forth for the moiſtning their Joyntings: It will not be eaſie (for that the matter lies ſo abſtruſe) to inveſtigate the particular reaſons of this Diſtemper, nor to conjecture further in this Ætiology.

We are no leſs at a loſs, how to proceed in the cure of this Diſeaſe: For although the primary indication, *viz.* the humectation of the Bones or Joyntings is obvious enough, yet by what means and by what Remedies that ſhould be performed, does not ſo plainly appear. For I have known in this caſe very many kinds of Medicines, and ſeveral ways of Adminiſtrations tryed altogether in vain. A certain ingenious man, labouring for many years with this Diſeaſe, had taken the advice of many, and of the moſt famous Phyſicians, and beſides the uſual Remedies againſt the Scurvy, (together with often letting Blood and purgations, from which he received no help) he tryed various and long courſes of Phyſick without any ſucceſs: for after he had under went a method preſcribed by one Phyſician for ſome months in vain, he applyed himſelf to another and ſo again to more. In the mean time, from each of them was

preſcribed

preſcribed always a new way of curing, uneſſayed by the former: Fomentations, Liniments, and Frictions are daily applyed to the Joynts, and ſometimes the Baths or Bath were uſed, and then ſeveral ſorts of purging waters, ſometimes one ſometimes another were drunk; all which nothing helping out, a chalybeate courſe was taken; and another time a decoction of the more temperate woods, ſometime a Milk Diet, and again at another time Electuaries, diſtilled waters, *Apozemes*, and other Remedies prepared againſt the Scurvy. After this manner when he had lived almoſt conſtantly medically and miſerably above three years, and nothing profited as to the Cure of the aforeſaid Diſeaſe, but in the mean time he was indifferently well as to his ſtrength and Stomach, he married, and as to the reſt of the common Symptoms of the Scurvy became better: Hence it appears too pertinacious a Diſeaſe, yielding almoſt to no Remedies, the crackling of the Bones is, which I have alſo proved in others, labouring with the ſame Diſtemper altogether mocking and eluding the skill and pains of the Phyſician.

CHAP. X.

Of the Vital Indication, in which are included Cardiack Medicines, Opiates, and Diet, or the manner of living as to Eating or Drinking, requiſite in the Scurvy.

WE have hitherto largely unfolded the Indications both Preſervatory and Curatory, which belong to the Cure of the Scurvy, it yet remains that we ſpeak of the vital Indication, to wit, that we may declare by what method and by what Remedies, the ſtrength of the ſick being too apt to languiſh, may be ſuſtained, or being loſt and caſt down may be reſtored. For theſe ends, Cordials and Opiates are preſcribed to be taken, according to the exigencies of the ſick, and beſides a right way of living as to Diet, and if need be an analeptick or reſtorative, and always anti-ſcorbutick is preſcribed.

As to Cardiack Medicines, to wit, which throughly agitate the Blood, ſtagnating in the heart, reſuſcitate or raiſe up its half ſpent flame, reſtore the animal Spirits oppreſſed or diſtracted to a free and due irradiation, it is obvious that very many Remedies which properly are called Anti-ſcorbuticks, do perform theſe intentions, of which ſort are the compound water of Radiſhes, the magiſterial of Snails and Earthworms, the Spirits of Hartshorn and Soot, the ſhelly Powders with many others, which are not only taken with benefit at certain hours, according to a method ordained in a certain order, but alſo as occaſion ſhall ſerve when ever a *ſyncope* or fainting of the Spirits ſhall happen.

But beſides thoſe who are found very obnoxious to paſſions of the Heart, frequent Swoonings, Nauſeouſneſs, Vomiting, Tremblings, *Vertigo's* and other horrid Symptoms, have alſo ready other ſorts of Medicines, more properly Cordials, by which they give relief immediately to their fainting Spirits. To this end is very convenient the *Elixir Vitæ* of the greater compoſition, in the diſtillation of the ſame *Elixir*, the ſecond water may be given to a ſpoonful ſweetned, alſo the Bezoartick Water, *Aqua mirabilis*, *Gilbert*'s temperate water, Treacle and Cinnamon water, to each of which compounded or of themſelves, may be added *Confectio Alchermes*, *Confectio de Hyacintho*, powder of Pearls or the magiſtery of Coral, Syrup of Clove Gillyflowers, of Coral, of Citron peels, or of Cinnamon: Of theſe and others of this Rank, divers forms of Medicines are wont to be preſcribed, as for Example.

Take of Treacle water and *Aqua mirabilis* each ℥iij, of Balm water ℥iiij, of the Syrup of Clovegillyflowers ℥iſ, of the Confection of *Alchermes* ℥j, mingle them: The doſe 3 or 4 Spoonfuls.

Or take of *Aqua mirabilis* ℥vj, of Snails and of Walnuts each ℥ij, of the Powder of Pearls ℈j, Confection *de Hyacinth.* ℥j, of the Syrup of Clovegillyflowers ℥j, mingle them.

When ſcorbutical Women are wont to be troubled with hyſterical Diſtempers, or Men with Convulſive; take of Balm and Pennyroyal water each ℥iij, the compound water of Briony ℥iiij, of the tincture of *Caſtor* ℥ſ, of the tincture of Saffron

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℥j, of the Syrup of Clovegillyflowers ℥iſs, of *Caſtor* tyed in a rag and hung in the glaſs ℥j, the doſe is 3 or 4 ſpoonfuls.

For thoſe who had rather have Cordials in a ſolid form, Electuaries or Tablets are preſcribed.

Take of the Conſerves of Clovegillyflowers ℥iij, of the Confection of *Alchermes* ℥iſs, of the powder of Pearl ℥, with as much as will ſuffice of the Syrup of Coral, make an Electuary.

Take of the *ſpecies* of *Diamargarit. frigid.* of *Diarrhodon Abbatis* each ℥iſs, of Pearls powdered, of the beſt Sugar diſſolved in Treacle water, and boyled up to Tablets ℥iiij, of the oyl of Cinnamon 6 drops, make Tablets according to Art.

As to what relates to Opiates and anodyne Medicines, in ſome diſtempers of Scorbuticks, I had rather want the uſe of any other kind of Medicines beſides than of theſe, for indeed I have found by often Experience, that there is no better Remedy, not only againſt pertinacious pains and wakings, but in aſthmatical paroxyſms, in Vomiting, Fluxes, and alſo in the *Vertigo*, and in the Convulſive Diſtempers, as often as nature being irritated or provoked above meaſure, hath fallen into moſt cruel inordinations, than that Sleep might be allured by ſome ſafe Narcotick being given: In the mean time there is need of caution, that they be not taken when there is any thing in the conſtitution of the Sick, or in the condition or time of the Diſeaſe, that may forbid the exhibition of ſuch a Medicine.

Beſides the hypnoticks uſual in the Apothecaries Shops, *viz.* Opiate, *Laudanum*, *Nepenthe*, *Philonium*, *Diacodium*, and Syrup of wild Poppies, I know two preparations of *Opium*, which I am wont to give in the form of a Tincture or more liquid extract, with any other appropiate Liquor from 10 to 20 drops.

Diet or the manner of living, to be obſerved by Scorbuticks in the curatory method, is not of the leaſt moment, which being neglected or ill inſtituted, the other preſcripts of Medicine profit very little or nothing towards health: As the diætetick Rule extends it ſelf to various things, yet chiefly it is imployed about the Air, the ſoyl of the habitation, Meat and Drink, and the motion and reſt of the Body.

As to the firſt, what kind of places and manſions in reſpect of the Heaven and Soil, do breed the Scurvy, and therefore ought to be avoided, appears ſufficiently by what we have above declared. Thoſe who ſtudie to prevent or to cure this Diſeaſe, let them endeavour to choſe and Aire moderately hot and dry, and which ſhall be alſo thin and pure and ſufficiently eventilated or winnowed.

Meats only for good Juice and well cooked are convenient; heavy, ſlimy, putrefied, fennewed and meats dryed in the Smoak, alſo unfermented aliments, or greatly compounded, Pulſe, Milkmeats, and unripe Fruits are to be ſhunned, Sweat meats or things candied, or very much imbued with Sugar, I ſo much blame, that I am apt to think the Invention and immoderate uſe of them, to have contributed very much to the cruel increaſe of the Scurvy in this Age. For indeed that Concreet is made up of a Salt ſufficiently ſharp and Corroſive, though mitigated with Sulphur, as may plainly appear by a Spagyrical *Analyſis* made of it. For Sugar (as we intimated before) being diſtilled by it ſelf, yields a liquor, little inferiour to the Stygian Water: for if you ſhall diſtil it, being poured to a good deal of ſpring Water in a Bladder, although the fixed Salt does not ſo aſcend, yet it produces a Liquor like to the ſharpeſt *Aqua vitæ*, burning and highly pricking: Therefore as Sugar being commixed almoſt with every aliment, is ſo plentifully taken in by uſe, it is very likely that from its daily uſe, the Blood and the Humours are rendred ſalt and ſharp, and from thence Scorbutick. A very famous Author hath attributed the cauſe of the Engliſh Phthiſick, or Conſumption, to the immoderate uſe of Sugar among our country men, and I know no reaſon, but that I may rather think the increaſe of the Scurvy derives it ſelf from this enkindling.

Let the Drink be midling Beer, mild and clear, and altered with antiſcorbutick Ingredients, but without any ingrateful taſte; let it not be thick nor ſweet, nor too ſalt and ſour, and let it be taken in a moderate quantity and almoſt only at the ſet times of Dinner and Supper: That which with many is thought a good Cuſtom, to wit, that as ſoon as they are out of their beds, to indulge themſelves with (as they uſually ſay) a large mornings draught, ſeems to be very pernicious. For by this means, for that the ſanguiferous Veſſels are too much filled with the proviſion of freſh Chyle, almoſt perpetually poured in, both Crudities and morbifick Fæculencies are begotten in the Blood, and the office of Sanguification greatly weakned. It is better indeed for moſt men (unleſs ſuch, who whilſt they are empty and uſed to have their Ventricle grievouſly wrinkled and drawn together) to remain faſting till dinner; nor is it a leſs adverſary to health according to the uſual cuſtom, to fill themſelves

ſelves with drinking full Cups preſently after Dinner. Wines or Cyder ſo they be mild, right and not adulterated, and moderately taken, do not hurt; but there is nothing more hurtful and injurious to our health, than thoſe adulterated, ropie, ſharp and growing ſour.

Exerciſe and Labour is ſo very profitable, both for the curing and the preventing of the Scurvy, that many by this remedy only have recovered their Health, or preſerved it intire: For in thoſe leading an idle and ſedentary Life, the Blood and nervous Liquor like ſtanding Water contract a ſlimeneſs and muddy ſetlement: But by much and aſſiduous motion of the Body, the Humours and the Spirits grow clear and vigorous, the excrementitious and heterogeneous Particles evaporate, the ſtuffings of the *Viſcera* are diſcharged and their tone ſtrengthned.

CHAP. XI.

Some Hiſtories and rare Caſes of Scorbuticks.

WHAT we have thus delivered, concerning the Theory and the Cure of the Scurvy, ſhall be yet illuſtrated more clearly by examples of ſickneſs, or by Hiſtories brought to light and explained according to the aforeſaid *Hypotheſis*. As there are manifold and divers caſes extant of thoſe labouring with this Diſeaſe, we ſhall here propoſe ſome more rare, excited by reaſon of the Taint being affixed in the Brain and nervous Stock, no leſs than in the Blood. *Obſervation.*

A Gentlewoman, tall and handſome, about 25 years of age, had contracted the ſcorbutick Taint by reaſon of various errors in living, or manner of life, the ſigns of which were a ſpontaneous wearineſs, difficult breathing, pains and ſpots in her Legs, beſides her Gums ſwollen and bloody; in the ſpring time after miſcarriage falling into a tertian Feavour, ſuddenly ſhe became languiſhing and weak, from which diſeaſe, however ſhe had been quickly recovered, being at firſt methodically cured, but that greedy of fleſh and other incongruous things, ſhe ſoon fell into a Relapſe. But then growing weary of Medicine, ſhe took only empirical Remedies, by which ſometimes her Ague fits were driven away, then ſoon after they returned: In the mean time ſhe remained pale, weak as to motion, breathing ſhort and ſwollen, and blown up near the Ventricle and *Hypochondria*. About the third month of her ſickneſs ſhe began to feel cruel Pains and Torments in her Belly; which afflicted her almoſt continually night and day, running about, now at her Back, now in her Stomach; Beſides ſhe was affected ſometimes with hyſterical Fits, and with a frequent Vertigo, alſo being troubled with often Vomiting, ſhe daily caſt forth a clammy and frothy Flegme. Within a months ſpace this Diſeaſe diſplaying its ends, ſtirred up Pains in the Back, Loyns and then in every part of the Body. But at this time ſhe complained of a great ſtraitneſs of her Breaſt, and a great contraction of the *Viſcera*. In the mean time the habit of her Body became very lean, that the Bones being deſtitute of fleſh, the Skin could hardly ſtick on them. Her Urine was little and red, on whoſe Superficies was a little Skin coloured like the tail of a Peacock. A little time after this, ſhe felt a ſtupor or numneſs and a ſenſe of pricking, ſometimes in her Belly, and ſometimes in her Limbs, and then the Pains and Torments began to be remitted, but in their place a Palſie ſucceeded, which within the ſpace of a week ſo invaded the Members of her whole Body, that ſhe could neither bend her hand or foot or any other part, nor move one jot from the place.

As to the Ætiology or the reaſon of the aforeſaid caſe, this is plain that theſe more grievous Symptoms did wholly ſpring from a ſcorbutick Root; for by reaſon of the Taint being fixed chiefly in the Blood, the ſpontaneous wearineſs, the difficult breathing, and alſo the intermitting Feaver wavering and often returning, and other previous and as it were more light Skirmiſhes of Symptoms were induced: further, the lixivial Urine and of variety of Colours, plainly indicated or ſhewed, a Blood corrupted with a ſulphureous Saline dyſcraſie or evil complexion: which kind of Piſs by that means well known, I have taken notice of in ſeveral others affected with the like Diſeaſe. But when the morbid Seed in this ſick Gentlewoman, being plentifully increaſed, and flowing thorow the Maſs of Blood, did ſpread into the confines of the *The Reaſon.*

Brain

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Brain and nervous Stock, the more grievous diſtempers did then ariſe; to wit, the morbifick Matter, conſiſting of heterogeneous and irritative Particles, being depoſited within the Brain, brought in the *Vertigo* and Swimming, or turning round, and the ſpaſmodick or cramplike Diſpoſition; then a Portion of it falling upon the Nerves of the intercoſtal and moving Pair, and being by their paſſages caſt upon the meſenterick Foldings, ſtirred up the ſcorbutick Colick; and when the ſame matter being hugely increaſed, had come to many other Nerves, the painful Diſtempers were propagated almoſt into every part of the Body; for that the acid Recrements like to vitriolick *Stagmas*, being depoſited every where from the nervous Liquor, did incounter with the lixivial Salts, every where alſo poured forth from the Blood: Then laſtly when all the Nerves being by degrees filled and ſtuffed with the morbifick Matter, were ſo much obſtructed that the irradiation of the Spirits and their commerce were hindred, the Palſie followed upon the whole Body.

The Cure. This Gentlewoman living far from hence, had taken Medicines by the advice of a neighbour Phyſician, uſual againſt the diſtemper of the Colick; notwithſtanding which, when the Diſeaſe grew grievous, the Patient being brought to *Oxford*, made tryal of very many Remedies, both Antiſcorbutick and Antiparalytick almoſt of every kind and form, but without any benefit. Therefore after that every ordinary method of Curing, ſeemed not ſufficient for this Diſeaſe, it was thought good to proceed to great Remedies, and indeed not altogether free from danger: wherefore we adminiſtred to her, as ſick, weak and lean as ſhe was, a mercurial Medicine for ſalivation. The effect of which ſucceeded to wiſh, for the Flux at the mouth being riſen within two days, and perſiſting gently for many days without any evil Symptom, brought great eaſe to this Gentlewoman. For the Pains being mitigated, ſhe began to move a little her Members, and to deſire and to digeſt better her Food, and alſo to enjoy quiet Sleep. The Salivation being finiſhed, ſhe took a Decoction of Sarſa and China with Antiparalytick ingredients for a few days; then being carried to the Bath, ſhe there uſed for ſome time the more gentle and temperate Baths, and preſently recovered an indifferent ſtate of Health. All the Winter, ſhe conſtantly took Medicines againſt the Scurvy and the Palſy, and when the following year, ſhe repeated the uſe of the Baths, ſhe grew perfectly well, and afterwards became the joyful Mother of ſeveral Children.

Obſervation. A Man about 40, of a Melancholly temper, labouring for many years with the Scurvy, was wont to be ſenſible of divers and manifold Symptoms of it, at ſeveral times of the year. There appeared about his Thighs Spots and black large marks as if coming of ſtrokes; pains of the Belly, with a Looſeneſs often troubled him; his Urine for the moſt part appeared like Lye, and he almoſt conſtantly had a ſpontaneous wearineſs, a failure of his ſtrength, and a want of Appetite: Beſides theſe ordinary evils, and as it were cuſtomary, he lived obnoxious to moſt cruel Fits of Sickneſs, and thoſe of various kinds. Two years before, when I firſt ſaw him, he complained moſt grievouſly of a difficulty in Breathing, as if he were in danger to be choaked, with a trembling of the Heart, with a fainting of the Spirits, and of a conſtant fear of Swooning: Beſides, if any of theſe Diſtempers in the *Præcordia* ceaſed a little, for the moſt part an heavy giddineſs in the head, and *Vertigo* aſſaulted him. After that he had taken for ſome time Antiſpaſmodick and Antiſcorbutick Remedies mixed together, he ſeemed to be perfectly well; but then within a few weeks he was affected with a nauſeouſneſs and pain about the Heart, with an inflation of the *Hypochondria*; his Urine was little and very lixivial, and ſhortly after the *Abdomen* ſwelled up, and then his Feet and Legs with a great wateriſh ſwelling, ſhewed the ſigns of a growing Dropſy: afterwards the ſame Tumour invaded the fleſh of his Thighs, Arms, and Back alſo: which Diſtemper however though it ſeemed deſperate, was eaſily cured with antiſcorbutick Remedies, with the addition of Catharticks and Diureticks. But yet this remarkable perſon, although he was reſtored to health, did not continue ſo long: for two quarters of the year were ſcarcely paſt but he began to complain of a grievous Head-ach, with a *Vertigo* and a pertinacious waking, and then without any evident cauſe, he was taken with moſt horrid Vomiting: a little while after, his aſthmatical fits, with the trembling of his Heart and ſinking down of his Spirits, returned. Alſo at this time, when he almoſt ſeemed deſperate, he again grew well in a little while, with the uſe of antiſcorbutick Medicines. It plainly appears by this caſe, how many evils the ſcorbutick infection, like to Ferment lying hid both in the Blood and nervous Juice, and as occaſion ſerves, ſpreading abroad its Poyſon, can cauſe; which kind of diſtempers, how horrid and terrible ſover they ſeem, whilſt they depend only of the Humors vitiated in their Complexion, and that the *Viſcera* are not at all hurt in their Tone or Conformation, are wont to be cured

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moſt commonly very eaſily, or without much trouble, *viz.* with an antiſcorbutick Method aptly deſigned, both according to the condition of the Patient, and of the Diſeaſe.

Obſervation.

A Lady about 25 years of Age, of a ſanguine Complexion, of a ſlender make of Body, of a fair skin and beautiful, had laboured for ſome time with the ſcorbutick diſtemper; for beſides broad ſpots and red ſwellings breaking forth in divers parts of her body, ſhe was wont to be troubled of a long time with cruel pains and torments, chiefly vexing her at nights, ſometimes in her Legs and ſometimes in her Arms: She had often begun to take Phyſick for the Cure, but being with Child was forced to give it over. After her laſt Child, for that ſhe had great fluxes, ſhe remained for many days languiſhing and weak, with difficulty of breathing, and upon any motion breathleſs. Being riſen up after lying in her month, and endeavouring to walk ſhe fell into a moſt grievous *dyſpnœa* or ſhortneſs of breath, with the trembling of the heart and a frequent fainting or ſinking of the Spirits: Being preſently put to Bed, yet trembling and with quick palpitations, ſhe continued ſo for almoſt a whole day; beſides her lower Members as if they had been dead, were altogether ſtiff and cold, and could not be made warm with the applications of warm cloaths or by rubbing: At length the night being almoſt paſt, ſhe found her ſelf better about her *Præcordia*, ſtrong Cordials having been often adminiſtred to her; but there ſucceeded a very acute pain on the top of her Thigh nigh to her left Groin, reaching even down to the Calf of her Leg, and within a few hours a hard tumour reſiſting the touch poſſeſſed all that ſpace. Being ſent for at this time whilſt the ſick was gaping for breath, a Clyſter being preſcribed and taken, I gave her 12 drops of the Spirit of Hartshorn, in a ſpoonful of the following Julap, ℥ij of the ſame being drunk afterwards. Take of the water of Snails ℥vj, of hyſterical water ℥iiij, of Walnuts ſimple and of Pennyroyal each ℥iij, of Sugar ℥j, of *Caſtor* tyed in a Rag and hung in the Glaſs ℥j. Theſe Medicines were repeated every ſixth hour. I took care to have a large Veſicatory to be applyed to the inward part of her Thigh, then in the evening for that ſhe had continued all this fit without any ſleep, I gave her j grain of *Laudanum*, of the powder of Pearls vj *gr.* of the Confection of *Alchermes* without Musk ℥ß. She ſlept quietly, and in the morning was very much refreſhed, the pain and tumour of her Thigh were ſomewhat abated, alſo while ſhe lay quiet in her bed ſhe was well at her *Præcordia*, but if ſhe ſat up or turned of one ſide, ſhe preſently ſeemed as if ſhe would expire with the *dyſpnœa* or want of breath. She continued to repeat the uſe of the Hartſhorn and Julap every ſixth hour for ſome dayes: but becauſe ſhe was oppreſſed with a troubleſome thirſt, and that her Urine was little and the Contents red and high coloured, ſhe took a doſe to ℥vj, twice aday of the following *Apozem.* Take of Graſs Roots, Chervil, *Eringo*'s preſerv'd, each ℥vj, of the ſhavings of Ivory and of Harts horn each ℥ij, of Hartshorn burnt ℥jſß, of Raiſins of the Sun ℥ij, 1 cut Apple, of Liquoriſh ℥ijſß, being cut and bruiſed let them be boyled in 3 pints of Spring water, to the conſumption of the third part; then add of Whitewine ℥iiij, let it be ſtrained into a Jugg, to which put of the leaves of Scurvygraſs and of Brooklime each *m.* j, of the Salt of Wormwood ℥ij, make an Infuſion cloſe ſhut and warm for 3 hours, being ſtrained let it be kept in cloſe Veſſels: Sometimes every day, ſometimes every other day they gave her Clyſters. By the daily uſe of theſe ſhe ſeemed to be better, ſo that within the ſpace of a Week ſhe was able, being raiſed from her bed, to ſit up in a Chair by the fire ſide for 2 or 3 hours: But if ſhe ſat up a little too long, or did but endeavour to ſtir, ſhe preſently fell into an aſthmatical fit or *dyſpnœa*; ſo that one day having ſtayed ſomewhat longer out of her Bed, having ſuffered a moſt heavy aſſault of the Diſeaſe, ſhe was afflicted with a difficulty of Reſpiration, with a trembling of her whole Body, and continual ſinking of her Spirits: By reaſon of this Relapſe of the ſick Lady, at laſt I being ſent for, gave her 20 drops of the Spirit of Hartshorn with the above preſcribed Julap, and at night a doſe of our *Laudanum*; but when ſhe began to be better about her *Præcordia*, the pains and tumors ſucceeded in her right Thigh and Leg as had happened before in her left: I alſo ordered a Veſicatory to be applyed to that Thigh, and beſides the Remedies hitherto cited, ſhe took twice aday of our Wine of the Juice of Scurvygraſs ℥iiij, with ℥ij of the magiſterial antiſcorbutick water. Beſides I ordered a Purge of our ſolutive Syrup above preſcribed, which ſucceeded ſo well, that I repeated it again within 3 or 4 days. With theſe Remedies ſhe grew well within a Month.

The Reaſon.

As to the Reaſons of the Symptoms obſerved in the aforeſaid caſe, firſt it is obvious from the ſpots and pains of the Limbs, that the Blood and nervous Juice had been for a good while touched with the ſcorbutick taint, which notwithſtanding lay hid within the aforeſaid humours, as it were ſubjugated and without any ſignal evil,

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ſo long as they were ſtrong in the Vital and Animal Spirits: But after the great hæmorrhage or Flux of Blood, when the Blood and nervous Liquor grew weak in their *Craſis* or Complexion, the particles of the morbid ſeed like to ferment, being moved, ſtirred up thoſe terrible diſtempers: That grievous *Dyſpnœa* or want of breath, ſeemed to ariſe from a double cauſe, or a concourſe of a double evil, to wit, becauſe certain pneumonick Nerves being beſet with the ſcorbutick matter, were hindred as to their office of Reſpiration: For from hence there was a neceſſity that the Lungs ſhould be ſwiftly moved, that they might draw the Blood from the heart, and the act of Reſpiration being more weak by reaſon of the Nerves being hindred, it became therefore more ſhort and very laborious: A fit of the *Dyſpnœa* urging, when as the Blood about the *Præcordia* was very much agitated, the extreme parts (which were then almoſt wholly wanting) by reaſon of its abſence grew ſtiff and cold; afterwards when as the Spaſms or Convulſions of the Lungs abated, that the Blood being greatly embued with the morbifick matter, which it had there ſupped up, looſned from its ſtagnation, was returned to Circulation, that ruſhing impetuouſly into her Thighs, firſt into her left, then into her right, the other being deſerted and ſo overflowing its Channels, being extravaſated with the ſerous filth, cauſed that ſudden tumour with the red ſwelling. But by reaſon of the ſhifting of the morbifick matter into the more ignoble paras to and again, the Diſeaſe though it ſeemed very dangerous, eaſily gave way to Remedies, altering the dyſcraſies or evil diſpoſitions of the humours, and gently carrying away the Reliques of the morbifick Mine.

Obſervation.

A Noble gentleman about 33 years of Age, of a ſanguine Complexion as he ſeemed to be, tall and ſlender, of a very ſharp wit and great underſtanding, although he had exerciſed himſelf very much for a long time in immoderate and unſeaſonable ſtudies, together with an inordinate way of living, yet to that time being freſh and full of vigor, he ſeemed to enjoy a whole mind in a ſound body; a little more than two years before, when he had very much tyred himſelf in dancing a whole night amongſt his Gueſts, in the morning going into a cold Bed in a Chamber ſomewhat moiſt, deſirous of a little Sleep he began to be Sick; for being awaked he fell into great perturbations about the *Præcordia*, with great fainting of the Spirits: After having taken a draught of Wine and ſome Cardiack Remedies, he was ſomewhat better; but by and by he relapſed, ſo that both himſelf and his friends feared all that day a mortal ſwooning or an imminent Apoplexy. But after this Aſſault of the Diſeaſe had paſſed over, he lived after that ſtill obnoxious to daily paſſions of the Heart, and upon any more great error in living, he was wont again to be troubled with moſt grievous fits. Notwithſtanding the uſe of Remedies, the Diſeaſe encreaſing upon him within a few Months, it not only infeſted the *Præcordia*, but in the whole habit of his Body, Suffuſions ſometimes of cold ſometimes of heat, and beſides a *ſtupor* or numneſs, or ſenſe of tingling or pricking, or light and ſudden Convulſions or Contractions in his Limbs were excited: And of late beſides theſe Symptoms ſpoken of already, which although they were very grievous to this Noble Gentleman, yet he was further troubled after a terrible manner with a frequent *Vertigo*, and with diſtractions and decay of the Spirits, that inhabit the forepart of the Brain, inſomuch that he was forced to abſtain from Studies and Political Affairs (to which he was always addicted) yea and from every more ſerious intention of the Mind; for otherways he felt thoſe ſort of perturbations both in the Head and in the Nervous Stock, that made him fear an Aſſault of the aſtoniſhing Diſeaſe, or moſt horrid convulſive Affections. Whilſt he had the more grievous Fits of this Diſeaſe, his Ventricle alſo was diſturbed for the moſt part, but he often received eaſe by Vomit, either by the free aſſiſtance of Nature, or by the help of an emetick Medicine. Hence ſome thought the cauſe of the Diſeaſe, to ſubſiſt altogether about the Stomach or the *Hypochondria*, but Catharticks, Emeticks, Digeſtive, Cephalick, Anti-ſcorbutick, Chalybeate, and other Medicines almoſt of every kind, preſcribed him for two years by the moſt famous Phyſicians, and alſo by Empiricks and Quacks, profited little towards the Cure of the Diſeaſe. Of late having tryed *Aſtrop* waters, he found himſelf worſe for the uſe of them, preſently deſiſting, he was next adviſed to be carryed to the ſulphureous waters at *Knaſborough* in *Yorkſhire*, but with what ſucceſs I have not as yet learned.

This caſe becauſe by reaſon of the Concourſe of various Symptoms, it can belong to no other kind of Diſeaſe beſides, it is not undeſervedly referred to the Scurvy; for it may be ſuſpected that the procatarctick or Remote Cauſe of this Sickneſs, lay in the evil diſpoſition of the Blood, to wit, that its Liquor was degenerated from a Balſamick and a ſpirituous, into a ſharp and ſulphureous-ſaline, by reaſon of theſe Elements being carried up above meaſure, which indeed ſeems to have happened partly from Errors in living, for that this Noble Perſon being often kept by buſineſs or more

ſerious

ſerious Studies even till Midnight, was wont to ſup at that time, and preſently to go to bed to ſleep: Further, this Diſeaſe did partly ariſe from a ſickly diſpoſition of the Spleen, and perhaps of the other *Viſcera*, ſupplying the Blood with a morbid ferment, neither is it altogether without reaſon, that we judge the Spleen ſhould be accuſed. PHAR. Part. II.

The Blood labouring with the aforeſaid Dyſcraſie, and from thence gathering together heterogeneous Recrements, eaſily poured the ſame on the head, being helped by the evident cauſe: Wherefore when the Brain by reaſon of immoderate and untimely ſtudies, being ſomething debilitated became leſs ſtrong to reſiſt the evils, and when for that occaſion before cited, the bloody Maſs being carried up into a greater ebullition, the pores of the whole Body being by and by ſhut up, it could not be ſo well eventilated, its great ſuffuſion or ſpreading into the head brought on the firſt manifeſt ſickneſs, to wit, from the Blood too much heaped up about the region of the Head; firſt the ſwelling up and *Phlogoſis* or inflammation of the Face came: Further, from the ſame at that time imputeouſly ruſhing on the borders of the Brain, and there ſtagnating the heterogene Particles, partly Narcotick, partly exploſive, fell down into the Origin of the Nerves, which being ſo beſet with incongruous matter, thoſe perturbations ſtirred up about the *Præcordia*, (for the Reaſons ſhown in the ſpaſmodick Pathology) did ſucceed. Further, for as much as the ſame matter being dilated towards the hinder part of the head, coming upon the Nerves, ariſing from the ſpinal marrow, it invaded the extreme paſſages and proceſſes of them all, and ſtirred up through the whole Body, a *ſtupor*, pricking, and the lighter Cramps or Convulſions. Moreover, becauſe the Nerves and their branches compaſſing about the ſanguiferous Veſſels, being affected with Convulſions were variouſly contracted, thoſe ſudden diffuſions or ſpreadings of heat and cold, by reaſon of the Bloods being as it were ſometimes reſtrained with a Bridle, and ſometimes agitated forward with a Spur, did ariſe through the whole Body. *The Reaſon.*

About the beginning of the Diſeaſe, becauſe the morbifick matter being ſuggeſted from the Maſs of Blood, breaking forth firſt either on the Region of the Cerebel, or if admitted into the Brain, being from thence preſently ſent forth, it fixed chiefly about the original of the Nerves, therefore the chief taint appeared in the nervous Appendix, and about its exteriour proceſſes without any *Vertigo* or previous ſwimming or Scotomy, or any notable hurt in the chief powers of the Soul: But afterwards by reaſon of the dyſcraſie of the Blood being daily encreaſed, and the conſtitution of the Brain or *Encephalon* being more weakned, the heterogeneous Particles alſo breaking through into the anterior Brain or the regal Palace of the Soul, they brought on both the diſtractions and meltings or ſinking down of the Spirits inhabiting there: So that this Diſeaſe after that its Roots being once planted ſomewhere within the *Encephalon*, did daily ſhew its intentions, notwithſtanding the uſe of Medicines, as that at firſt only the original of the nervous wandring pair, and the intercoſtal were infected, and then afterwards the morbifick matter entred into the proceſſes and interior paſſages of the other Nerves of the whole Body, which being filled full, at length that being carried by the as yet impure Blood into the Brain it ſelf, it poſſeſſed its more noble Cells, which kind of Cephalick Diſtempers, I have obſerved to have made the like progreſs in many, ſo that it plainly appears theſe Symptoms excited by ſuch a *Series*, ariſe by reaſon of the aforeſaid Cauſes, and not from Vapours ſuppoſed to be elevated from the *Viſcera* or Inwards.

But that a fit urging oftentimes the Ventricle was diſturbed, alſo that it was wont to be ſuddenly eaſed by Vomit, it will not be difficult to ſhew the reaſons without prejudice to this *Hypotheſis*. As to the firſt, there is nothing more plain than that the Ventricle is ſubverted, and that a nauſeouſneſs or Vomiting doth ſucceed, by reaſon of ſome grief inflicted on the Origin of the Nerves, as we have at large already declared, then there is more reaſon for that Vomiting ſhould bring preſent help: For in the firſt place, as the Nerves of the wandring pair and the Intercoſtal are very much ſhaken, (as it is the manner of the Nervous Parts) they preſently remit their inordinations excited from an internal cauſe, as an itching or pained member is freed from grief if it be ſcratched or rubbed. But the aforeſaid Nerves being greatly ſhaken together and contracted in Vomiting, they eaſily ſhake off the morbifick Matter, fixed to their ends or extremities; by which it comes to paſs, that oftentimes a ſharp or acid Matter, or otherwiſe infeſtous, being heaped up within the firſt Paſſages, and there either infecting the Blood, with its hurtful Ferment, or irritating the nervous Bodies, into Convulſions, is brought away by Vomit, and ſo the Fountain or Provocative of the Diſeaſe is carried forth.

PHAR. Part. II.

As to the therapeutick or curatory Method, to be uſed in this caſe, and others like it, there are two intentions which are chiefly to be inſiſted on, *viz.* In the firſt place to make pure the Maſs of Blood, and to bring away the noxious Ferment adminiſtred from the Ventricle, Spleen, and other *Viſcera.* Secondly, that the Brain and nervous Stock be ſtrengthned, leſt they admit of extraneous Particles: and that the nervous Juice watering thoſe parts, degenerating from a right into acetous or otherwiſe morbid *Craſis*, may be rectified and reſtored. The firſt of theſe are to be performed by Cathartick, Emeticks, Phlebotomy, and chiefly by ſpecifick Medicines, correcting the ſcorbutick Taint of the Blood, or carrying it quite away: But as to this Iron or Vitriolicke Spring, celebrated for the purging the Blood, that they were rather hurtful than helpful to this Gentleman, the cauſe ſeems to be, both for that the Brain being made weak by reaſon of thoſe Cephalick Diſtempers, hardly excluded the filth of the Water ſent from the Blood, but was in danger to be overflown, by it's falling more furiouſly upon its Confines; and alſo becauſe when the nervous Liquor degenerating from its *Craſis*, turns ſowr, it is wont to be more preverted by the fluid Salt of thoſe purging Waters. Wherefore we have ſtill obſerved, that the drinking thoſe Waters, in a Rheumatiſm and the Gout, hath increaſed the morbid Diſpoſition. The ſecond intention is beſt inſtituted by cephalick Remedies, and chiefly thoſe indued with a volatile Salt, of which ſort are Spirits, and Salt of Blood, Soot, and Harts-horn, of the Roots and Seeds of Peony, the leaves of Miſletoe, *&c.* With which Antiſcorbuticks may be mixed.

FINIS.

TWO

DISCOURSES

CONCERNING

The Soul of Brutes,

Which is that of the

Vital and Senſitive of Man.

The Firſt is PHYSIOLOGICAL, ſhewing the NATURE, PARTS, POWERS, and AFFECTIONS of the ſame.

The Other is PATHOLOGICAL, which unfolds the DISEASES which Affect it and its Primary Seat; to wit, The *BRAIN* and *NERVOUS STOCK*, And Treats of their CURES: With Copper Cuts.

By *THOMAS WILLIS* Doctor in PHYSICK, Profeſſor of Natural Philoſophy in *OXFORD*, and alſo one of the Royal Society, and of the renowned College of Phyſicians in *LONDON*.

Engliſhed

By *S. PORDAGE*, Student in PHYSICK.

LONDON,

Printed for *Thomas Dring* at the *Harrow* near *Chancery-Lane End* in *Fleet-ſtreet*, *Ch. Harper* at the *Flower-de-Luce* againſt St. *Dunſtan's* Church in *Fleet-ſtreet*, and *John Leigh* at *Stationers-Hall*. 1683.

To the most Reverend Father in God

GILBERT

(By Divine Providence)

Arch-Bishop of Canterbury,

Primate and Metropolitan of all *ENGLAND*, and one of the Privy Council to His Sacred Majesty *CHARLES* the Second, King of *Great Britain*, *France*, and *Ireland*, &c.

Most Renowned Prelate,

IN that I still become troublesom to your greater Cares, by this Kind of often repeated Duty, I must also repeat my former Excuse. For that these my VVritings, with those formerly Published, for the most part consist of those things which I have delivered in my Academical Readings, by a necessitated Duty belong to you, for that I received them from your Favours; and indeed, neither these had ever seen the Light, nor perhaps my self had ever been in the number of Authors, unless I had been made at first your Sidlie Professor at Oxford; yours I say, both for the ancient Honour with which you had advanced me, and also for the more fresh magnificent Liberality, which has obliged the whole Academy, and all its Gowned Company. All the Schools partake of what is imputed to your Theatre; and moreover all the Professors, whil'st every one of their private Patrons are acknowledged, Celebrate Sheldon; who exceeds, by your gifts that of other Mecænatuses, and Crowns the whole.

But as these Disquisitions are indebted to your Munificence, so they require your Patronage, and we offer them not more in Duty to your Grace, than for the Cause of your

Tutelage. Concerning the Soul, I have enter'd upon a great and difficult thing, and full of hazard; where we may equally fear the Cenſures of the Church, as the Schools. For that I aſſert a Man (as the Mad-man in the Goſpel poſſeſs't with a Legion) to be indued with many diſtinct Souls, and deſign ſometimes a legitimate Subordination of them, and ſometimes wicked Combinations, troubleſom Conteſts, and more than Civil Wars; yea, and in that I importunately deſcribe, the Manners and Affections, the Mutual Exaltations, Dejections, and Productions of either, and their ſtate after Separation: Theſe, I ſay, ſome not only Philoſophers, but Theologiſts perhaps may find fault with. And althô I have a place of Safety, in that the Arguments and Reaſons fight on my Side, and that I have got the Suffrages of the ancient Philoſophers, and the holy Fathers (and eſpecially of St. Hierome *and* Auguſtine, *and among the Moderns of* Gaſſendus *and our* Hammond) *yet ſuffer your Grace for my greater Safety, to extend your help to me, and grant that I may profeſs in the Entrance to this Diſcourſe, that I am*

Your Graces

Moſt humble and devoted Servant

Tho. Willis.

To

To the Most LEARNED and WORSHIPFUL

By me ever Respected

The Vice-Chancellor, Doctors, *and* Masters, *who diligently Profess, greatly Adorn, and happily Promote good Letters in the most Famous University of* Oxford, *Health.*

EXcuse me, Learned Men, if you, who were once my Auditors, I now desire to be my Readers, and you whom I ever found Propitious and Favourable, that I therefore wish you may be my Judges and Patrons. Your singular Humanity hath formerly enflamed my Industry, in this Physiological Undertaking, and given me Life and Strength; so that if that any thing of Praise be due to me, it ought to be imputed and referred to you. I know indeed how great difference there is, betwixt the flying words of Speakers, and those impress'd upon lasting Papers; but it seems of great Authority, that they have not been displeasing to your most Curious Judgments, in their utterance, and I hope they may now pass any Examen, having already passed your Critical Ears. It therefore belongs to you to defend, if not these my Endeavours, yet at least your own Judgments; and if perchance, the litterate *Thrasoe's* of this Age, who are wholly ignorant in Philosophy, every where wandring about, attempt to overthrow me with their Clamors, which is their chief Eloquence, to oppose your Authority against them, by which, if they are not put to Silence, it will be however an high Confidence and inviolable Security to

Honored Sirs,

the Admirer of you all,

THO. WILLIS.

THE

THE PREFACE TO THE READER.

Courteous Reader,

I *Have here given you what I had long promiſed, the* Pathology *of the Brain and Nervous Stock, and with it the previous Phyſical Meditations of the Soul of the Brutes, which is that inferior one of Man. This difficult task, when at firſt denied leiſure and retirement, it could not be performed; after the Death of my Dear Wife, being lonely, with frequent and unſeaſonable Studies, that I might the leſs think on my Grief, I have at laſt finiſhed this, according to my ſlender Capacity. But indeed in theſe Diſquiſitions (which the Anatomy of the Brain, and its Appendixes, hath lately and more exactly ſhown) as we have enter'd into a by-way, and not before trodden, there was a neceſſity to lead thee, thorow ſome ſharp and ſtony ways, beſet with buſhes and thorns, which might offend thee. And indeed I know not, whether it will be pleaſing to all, that inſtituting the ſomething Paradoxical Doctrine of the Animal Soul, that I ſhould aſſign to that Soul, by which the Brutes as well as Men live, feel, move, not only Extenſion, but Members, and as it were Organical Parts, yea peculiar Diſeaſes, and proper means or methods of Curing them; and that moreover, I ſhould form this, which is meerly Vital, and different from the Rational, and ſubordinate to it, and ſo Man, a Two-ſoul'd Animal, and as it were a manifold* Geryon.

That I may remove out of the way theſe little rubs, I do not at all doubt to overcome them, and evince the Corporeity of the Soul, by Reaſons not to be contemned, and alſo by the full ſuffrage, both of the Ancients and the Moderns; and beſides, that it is Bipart or Twofold, I have already, in another place, by a neceſſary Conſequence deduced, from the Life of the Blood, as it were a flame, and from the exiſtency of the Animal Spirits, and as it were lucid or ætherial Hypoſtaſis, aſſerted and proved. For granting to the Soul, one Vital Portion living in the Blood, to be a certain inkindling of it, and another Senſitive, to be only an heap of Animal Spirits every where diffuſed thorow the Brain and Nervous Stock; it follows from hence, that Brutes have a Soul Co-extended to the whole Body, and Parts not only many and diſtinct, but after a manner diſſimilar. But that ſome object, that the Soul of the Beaſt, becauſe it perceives, or knows that it feels, to be immaterial, for that Matter ſeems to be incapable of Perception, that indeed, had been likely, if that Perception ſhould paſs beyond the limits of Material things; or higher, than what inſpires them, which things are uſually attributed to Natural Inſtinct, or Idiocraſie or peculiar Temperaments, that I may omit Sympathies and Antipathies. But who ſhould be the Betrother? I profeſs the great God, as the only Work-man, ſo alſo as the firſt Mover, and auſpiciouſly preſent, every where, was he not able to impreſs ſtrength, Powers, and Faculties to Matter, fitted to the offices of a Senſitive Life? The Pen in the hand of the Writer, Diſputes, Intreats, gives Relations of things, and is in the mid ſt between things paſt and things to come; and why ſhould we not believe that greater things than any of theſe, may be done, when the Skill

of

of the Deity is preſent? Laſtly, If any one ſhall affirm, that moſt ſubtle Subſtance, and wholly Etherial, which ſerves for the Vital Oeconomy or Government to be immaterial, for that it enters upon the ſluggiſh Diſpoſition of inanimate Bodies, let him remember to be indulgent to me, if by chance I call it material, for that it ſubſiſts very much below the Prerogatives of Reaſon.

But I ſhall not ſtand upon theſe things, for truly I have prepared a far othergates defence; to wit, I ſpeak not from the Tripos *like an Oracle, nor from the Chair, but as one of a low form: I play not the Prophet, or Dictator, but the Philoſopher, neither do I plant an Opinion, but propoſe an Hypotheſis, and open my Judgment. Geometry has its Demonſtrations in it ſelf; we are Skill'd in that part of Philoſophy, where it aboundantly ſuffices to have brought Logical Proofs: Surely he only certainly pronounces, who profeſſes his Errors, and whil'ſt he Philoſophizes about Man, remembers himſelf that he is a Man.*

But that according to the Adage, that I ſhould declare ſome to be rather ſick in Soul, yea firſt, and chiefly than in Body; otherways than the Schools of Phyſicians, which refer the Primary Seats of all Diſeaſes, into ſolid Parts, Humors, and Vital Spirits, or innate Heat: I ſay from our Hypotheſis, to wit, that this Soul hath a material Subſiſtence, extented equally with the Body, and peculiar Parts, Powers, and Affections; may be concluded, that it is found obnoxious alſo to preternatural Diſeaſes, and not ſeldom wants Medical help.

Moreover, That the Corporeal Soul doth extend its Sickneſſes, not only to the Body, but to the Mind or rational Soul, which is of an higher linage, and that it often-times involves it with its failings and faults, I think is clear enough in our Pathology or Method of Curing. Further, for the proving theſe two diſtinct Souls, to be together and ſubordinately in Man, as much as Authority and the force of Reaſons can, I think is there proved; which Opinion is ſo far from that I need to fear it ſhould be cenſured for Pernicious or Heretical; that on the contrary, we hope it is altogether Orthodox, and appears agreeable to a good Life, and Pious Inſtitution: from hence the Wars and Strivings between our two Appetites, or between the Fleſh and Spirit, both Morally and Theologically inculcated to us, are alſo Phyſically underſtood; for that, I ſee and approve the better things, and follow the worſer; *and this,* The Fleſh luſts againſt the Spirit, and the Spirit againſt the Fleſh. *So generally comes to paſs in us, for as much as the Corporeal Soul adhering to the Fleſh, inclines Man to Senſual Pleaſures, whil'ſt in the mean time, the Rational Soul, being help'd by Ethical Rules, or Divine favour, invites it to good Manners, and the works of Piety. Further, from hence, the chief Argument is brought againſt Epicuriſm, and Atheiſm, for that it is moved by the force of Reaſons, our Senſitive Soul even as that of the Brutes, miſcarrying, the other perpetually ſurvives; for truly being perſwaded of an after and Eternal State, why doth it not make it its whole buſineſs, that it may live more happily in it, or at leaſt not miſerably?*

But alſo, that it may be objected, that there cannot be therefore two Souls in Man, becauſe many forms cannot actuate at once the ſame Matter; It may be anſwer'd; that the Supream form of the ſame Subject, doth ſometimes ſubordinately include many others, but ſpecifies it only a Compound. Alſo, the Corporeal Soul being ſubordinate to the Rational, ſubſiſts immediately in the Humane Body, and this Superior is in the ſame, that mediating. It would be a much more difficult ſolution of this hard Buſineſs, if the Inferior Soul of Man, common to that with the Brutes, ſhould be alſo affirmed to be immaterial; for by what knitting together, can two independent Souls ſubſiſt in the ſame Body; being from thence ſeparated and Combined, by no common Bone, into what place can they depart ſeverally? Certainly as to reaſon, it is more probable, and to the Humane government more agreeable, to affirm that one moſt ſubtilly Corporal Soul, is joyned immediately to the Body, and is intimately united, and that by the intervention of this Soul, another immaterial, reſiding in its Boſom, inhabits the Body, and is the ſupream and principal form of the whole Man: But that after Death, the Corporeal Soul being extinct, this ſurvives and is Immortal.

That

That the Corporeal, Flameous, and lucid Nature of this Soul, and its Parts and Affections, may be the better known, I have thought it neceſſary to deſcribe the Vital Organs, both of all Kinds of living Creatures, by the Action of which the Lamp of Light is maintain'd; and alſo to ſhew plainly laid open, even to their intimate receſſes, and leaſt and ſecret Paſſages, the Brains, both of the more perfect Brutes, and alſo of Man. The Anatomy of which being manifold; not being able to perform it only with my own hand, and Skill, being alſo almoſt continually interrupted by my Practice, the Famous and Skilful Anatomiſt and Phyſician Dr. Edmond King *was much helpful to me, by his aſſiduous and notable aſſiſtance and labour. Alſo that learned Man, and my moſt intimate Friend, Dr.* John Maſters, *Skilful in Phyſick and Anatomy, imployed much of his Labour and Diligence in the ſame Buſineſs. Out of this various* Zootomie *or Anatomy of the more perfect Beaſts and many-flower'd diſſection, the wonderful things of God are very much made known, for as much as in every the ſmalleſt and vileſt little Animals, not only the Face and Members, but alſo the inward Parts, as it were the Hearths and Altars for the continuing the Vital Fire, ſhew them to be of a moſt Elegant and Artificial and plainly Divine Structure.*

As to our Pathology *or Method of Cure, I muſt confeſs, that in delivering the Theory of Diſeaſes, leaving the old way, I have almoſt every where brought forth new Hypotheſes: but what being founded upon Anatomical Obſervations, and firmly ſtabliſhed, better ſolve all the Phænomena of the Sick,* (viz.) *They declare more aptly the Cauſes of the Symptoms, and ſhew the Reaſons of Curing, more accommodate to every Diſeaſe. But as to the Remedies and Therapeutic Method, althô we follow not exactly, after the manner of others, the Ancients, we have nevertheleſs rejected nothing ratified by grave Authority, or approved by daily Experience; and beſides, we have added many things found out Emperically and Analogically by the Moderns; Althô it is neither our Hope or Ambition that theſe ſhould be pleaſing to all; yet (what is my laſt wiſh) I doubt not, but that this may be an help to many for the illuſtrating the Medical Science, and for the more happy Curing of Cephalick Diſeaſes.* Farewel.

OF

OF

The Soul of the Brutes,

The First Part

PHYSIOLOGICAL,

SHEWING,

Its NATURE, PARTS, POWERS, and AFFECTIONS.

CHAP. I.

The Opinions of Authors both Ancient and Modern are recounted.

The Contemplation of the Soul pleasant but difficult.

With what Pleasures, and with what Delight, beyond other things, the Contemplation of the Soul hath drawn to it self the Wits of Men, and most profoundly Exercised them, appears even from hence, that almost none of the Philosophers, of whatsoever Sect they were, and of every Age, who have not laboured in the search of it: But indeed, how hard and abstruse it is, and with what dark Blackness, not less than the shades of Hell it self, this Knowledge of the Soul is over-shadowed, may be gathered from this; because they are opposite and uncertain, concerning it; yea, almost as many Men as there are, so many several Opinions have they Published; that truly 'tis no unjust Complaint of the Soul, that she understands all things but her Self. Nevertheless, in this Age, most fruitful of Inventions, when that so many Admirable things not before thought on, as it were another Ancient World unknown, are discovered, about the building of the Animal Body, when new Creeks are daily found out, new humours spring up, and altogether another Doctrine than what hath been delivered by the Ancients, concerning the use of many of the Parts, hath been instituted; why may we not also hope, that there may be yet shewn a new disquisition concerning the Soul, and with better luck than hitherto? Therefore, however the thing may be performed, I shall attempt to Philosophise concerning that Soul at least, which is Common to Brute Animals with Man, and which seems to depend altogether on the Body, to be born and dye with it, to actuate all its Parts, to be extended thorow them, and to be plainly Corporeal; and that chiefly, because, by the Nature, Subsistence, Parts, and Affections of this Corporeal Soul rightly unfolded, the Ingenuity, Temperament, and Manners of every Man may be thence the better known; as also the Causes, and formal Reasons of many Diseases, as of the Phrensie, Lethargy, Vertigo, Madness, Melancholy, and others, belonging rather to the Soul than to the Body, as yet hidden, may in some part be discovered: Then Secondly, because the ends and bounds of the aforesaid Corporeal Soul being defined, the Rational Soul, Superior and Immaterial, may be sufficiently differenced from it; nor is that Argument admitted so easily, confounding them together, whereby some deserving very ill of themselves, have affirmed the Souls of Man and the Beasts only to differ in degrees of Perfection; and so that either alike must be either Mortal or Immortal, and alike propagated *ex traduce* or from the Parent. Wherefore that the Dignity, Order, and Immortality of the Rational Soul, discriminated from the Corporeal, may be vindicated, and likewise that we may make a way to the remaining Pathology, or Method of Curing of the Brain and Nervous Stock, in which not only Parts of the Body, but often the animal Spirits, yea, sometimes the whole sensitive Soul, seems to be affected, (altho we have formerly unfolded according to our slender Ability, not after this manner, the Descriptions and Uses of the Brain and Nerves,) Therefore at present, we

It Conduces to the knowing of the Manners of Men, and the Diseases of the Soul.

It distinguishes the Rational Soul of Man, from that other of the Brute.

ſhall endeavour to deliver a certain Doctrine of the Soul, previous to the ſhewing the Doctrine of the Diſeaſes of thoſe Parts. But here it will be firſt expedient to rehearſe the Opinions of others, or at leaſt the chiefeſt and moſt noted among them: From which, being put together, if not what the Soul truly is, may be made known; yet what many conſidering it have thought of it; and from thence a little more certain ſearch of it, we may enterprize.

And indeed if we would grow wiſe concerning the Soul only out of the Pleas of Authors, and the Writings of Philoſophers of every Age, we ſhould be intangled in a Labyrinth of Opinions, following for truth mere Phantaſms, and for the genuine Idea of the Soul, as it were the Apparitions of divers Specters. But that we may reduce the various Opinions, whatever have been declared, both of the Ancients and Moderns, to ſome certain Heads; it will be fit that we obſerve, ſome did affirm it to be Corporeal, others Incorporeal. In either Kind we meet with great diverſity of Opinions. For firſt of all, among thoſe who thought it Incorporeal, ſome affirmed it to be a Subſtance exiſting of it ſelf and immortal, others without Subſtance having only an accidental form. Thoſe who believed the Soul an Incorporeal and Immortal Subſtance, differed alſo among themſelves. The *Platoniſts* and *Pythagoreans* ſaid, the Souls of all living Creatures, to be a certain Part of the Univerſal Soul of the World; and that they were depreſſed or immerged in this lower Body, as in a Sepulcher; and therefore, the Soul, when the Animal received Life, was not born but dyed; for as much as by this inferior Birth, it was divided from the ſimple and undivided fountain of Nature. Further they thought, that the ſame Soul ſo demerſed, did wander from one Body being dead, to another, and ſo by a various *Metampſeuchoſis*, did inhabit or was a gueſt ſometimes in the Bodies of Men, and ſometimes of Beaſts. The *Manichees* aſſerted, That all Souls being taken out of the Subſtance it ſelf of God, did actuate Terreſtrial Bodies, and going from hence again, returned into God himſelf. The *Origeniſts* different from either, taught that Souls were Created from the beginning of the World, and at firſt to ſubſiſt of themſelves, then as occaſion ſerv'd, that Bodies being formed, they enter'd into them being begun, and actuated them during Life, and that at length they returned to their private or ſingular Subſtances. The ſtate of which Souls, tho ſome attributed it only to Humane Souls; yet there were others, who granted the like Immortality to the Souls of the Brutes, yea and of Plants.

Some have affirmed the Soul of the Beaſt to be an Incorporeal Subſtance; to wit, the Platoniſts, *and the* Pythagoreans.

On the contrary, *Nemeſius* (but untruly) ſaith, That *Ariſtotle* affirmed the Soul to be Incorporeal, but without Perfection and Mortal, when he had deſigned the *Entelechia* or Perfection of every living thing; as to wit, She as it were ariſing up of her own accord, from Power only of matter rightly diſpoſed, underſtands nothing elſe, but its own Craſis or Temperament, reſulting from the mixture; which as it adds nothing ſubſtantial to the præexiſting Matter, the Soul it ſelf ſeems to be from thence a mere *Ens* of Reaſon, and only an extrinſical denomination. Further, when the *Peripateticks*, from the Soul raiſed up out of the Grave of Matter (which they affirmed to be a ſimple form, without Extenſion and diviſibility) do contend that the Members of the ſame Body, do perceive many things at once and together, they have introduced into the Schools that Plea or rather Riddle, to wit, *That it is whole in the whole, and whole in every part.* To this Opinion thus unfolded, that of *Dicaarchus* was a-Kin, who ſaid the Soul was *Harmony*, and alſo that of *Galen*, who call'd it a *Temperament*.

Cap. 2. de Nat. Hom.

Others an Incorporeal form as the Peripateticks.

Nor do we meet with a leſs diverſity of Opinions, among the Philoſophers of every Age, delivering that all Souls, or all others, the rational excepted, are Corporeal. To paſs by thoſe who have affirmed the Soul to be either Fire, or Air, or Water, or ſomething made out of many of theſe Elements; ſome, as *Critias* and *Empedocles* have ſaid, that it was *Blood*. Which Opinion the Sacred Scriptures in ſome places plainly favour, where the eating of Blood is forbidden, becauſe it is the *Life* or the *Soul*: Moreover, there are not Reaſons and Arguments wanting, which conclude this to be very near, or very like to Truth; as ſhall be ſhewn anon.

Others affirm the Soul to be Corporeal, and either ſomething out of the Elements or the Blood, &c.

To theſe may be added, the Opinion of *Epicurus* delivered of old, and of late revived in our Age, which introduces the Soul plainly Corporeal, and made out of a knitting together of ſubtil Atoms, and aſſerts, citing *Laertius*, ὅ τι ἡ ψυχὴ, &c. which according to the mind of *Gaſſendus*, is as much as to ſay, *That the Animal is as it were the Loom, in which the Yarn is the Body, and the Woof the Soul.* From thence *Laertius* deſcribing more fully its Corporeity, ſaith, ἐξ ἀτόμων, &c. *which is, that the Soul is Compoſed of moſt light Atoms, and round, not much different from thoſe out of which fire is.* Other *Epicureans* deſcribing the Nature of the Soul, otherways, depaint it as from ſomething hot, flatuous, and airy, we need not to unfold any further this Opinion, nor ſhew out of *Laertius* and *Lucretius*, by what Rite the Aſſertors of the *Epicurean* Philoſophy, do accommodate ſuch an Atomical Compoſition of the Soul, to all the Actions and Affections of the Function, or Animal Government, which are to be performed.

The Opinion of Epicurus, *that the Soul is made out of Atoms.*

Upon

Upon this Hypotheſis of the *Epicureans*, as it were its baſis, the Philoſophers of this latter Age have built all their doctrines of the Soul, tho very divers, and I may almoſt ſay oppoſite. For as the ſoul of the Brutes, is affirmed by moſt of them, to be Corporeal and diviſible, yet ſhe is by ſome of them deprived of all Knowledg, Senſe, and Appetite; in the mean time, not only Senſe, Memory, and Phantaſie is granted to her by others, but the uſe of a certain inferior Reaſon. And what is more to be wonder'd at, the ſame end of their Aſſertion is propoſed by either Sect; to wit, That the Soul of the Brutes, both as it may be deprived of its gifts, and alſo as it is moſt notably adorned by them, may be very much diſtinguiſh'd, *or* (that I may uſe the Idiom of the Schools) diverſified from the humane Soul.

The late followers of the Philoſopher Epicurus *have affirmed the Soul to be made of Atoms.*

The firſt Aſſertor of the former Opinion was *Gometius Pereira*, who affirmed that Beaſts wanted all Knowledg or Perception; whom in our latter Age, the Famous Men *Carteſius* and *Digby*, with others Exactly followed; who endeavouring as much as they could, to diſcriminate the Souls of Beaſts from the humane, affirmed them, to be not only Corporeal and Diviſible, but alſo meerly paſſive; that is, that they were not all moved, unleſs that they were moved by other Bodies, ſtriking ſome part of the Soul; from whence it followed, that every action of the Brute Conſiſted in it, as it were an artificial Motion of a Mechanical Engine, to wit, that firſt ſome ſenſible thing affecting the animal ſpirits, and Converting them inwards, ſtirs up ſenſe; from which by and by, the ſame ſpirits being moved, as it were by a reflected undulation or wavering, return back again, and being determinated for the fitted order of the organs and parts of the Fabrick it ſelf, in certain Nerves and Muſcles, they perform the reſpective motions of the Members: For otherwiſe, if Cognition be granted to the Brutes, you muſt yield to them alſo Conſcience, yea and deliberation and Election, and a Knowledge of univerſal things, and laſtly an incorporeal and rational ſoul.

Others of them deny it to have Senſe and Perception, as Gometius Pereira.

Whilſt theſe famous Philoſophers ſuppoſe Brute Animals to be only certain Machines wonderful made by a Divine Workmanſhip; to wit, which without any Knowledg, Senſe, or Appetite, perform only Corporeal Motions, and the Acts of their Faculties, according to the fitted ſtructure of parts, and the preciſe direction of the ſpirits, within Certain meaſures or bounds of the Animals; yet ſome of them differ in their Opinions, about the ſtructure and model of the Machine or moving Engine; to wit, for as much as the figure and properties of the Atoms, out of which the ſame is ſuppoſed to be made, are aſſigned one way by theſe, and after a divers way by thoſe. The moſt illuſtrious *Carteſius*, unfolding all things by matter and motion, aſſerting the Souls of Brutes to conſiſt altogether of round and highly moveable Atoms, which he Calls the Elements of the firſt Kind; affirms, That nothing elſe is requiſite for all its acts to be performed, than that the fibres and nervous parts being ſtruck by a ſtroke of a ſenſible thing, they receive a motion after this or that kind of manner, and transfer it by a Continued affection of the ſenſitive parts, as it were by a Certain undulation or wavering, into the reſpective parts: But our *Digby* ſuppoſing mobility of the particulars of this kind, out of which the Soul is made, adds further, That certain moſt thin Effluvia's, falling away from the ſenſible Body, do not only affect the Exterior ſenſories, but entring into the more interior receſſes, mix themſelves with the ſpirits, and moving them into Various fluctuations, do produce ſenſe, and divers ſorts of local motions: Moreover, that out of theſe Extrinſical Atoms, ſo entring into the nervous parts, and the Brain it ſelf, do proceed not only Extempory Actions; but out of thoſe left in the feeling body, and retaining the former Configurations, are Conſtituted the remaining Idea's, in the memory of things formerly done. It would be too prolix a buſineſs to recount particularly what appertains to the aforeſaid Hypotheſis, concerning the ſouls of Brutes, or animal Actions; or to Examine the Reaſons of each; alſo to ſhew by what manner of Solutions of that Kind, thoſe operations of the Brutes, which ſeem to be made by a Certain Judgment and Ratiocination, are wont to be unfoulded.

Carteſius.

Digby and Others.

But indeed theſe Solutions of difficult *Phænomena's*, and the Reaſons for the mechanical proviſion of living Creatures, and their Souls, tho artificially formed by theſe Authors, ſeem not to ſatisfie a Mind deſirous of Truth: And whilſt every one expounds ſo the Works of the Creation, according to the model of his Wit, they ſeem to ſay, That God is not able to make any thing beyond what Man is able to Conceive or Imagine. Wherefore others, alſo renowned Philoſophers, both Ancient and Modern, profeſſing themſelves no leſs adverſe to Atheiſm than the former, Challenge in the behalf of the Beaſts, not only the operations of an external and internal Senſe, with Perception, Appetite, and ſpontaneous motions; but beſides, grant to them a certain uſe of Judgment, Deliberation, and Ratiocination.

Others attribute to the Corporeal Soul, ſence and Perception; and further, the uſe of an inferior Reaſon; as

Nemeſius an ancient Philoſopher, diſcourſing of the Cognation or Propinquity of all Created things, after he had ſhewed from Minerals, that ſome things came near towards

Nemeſius.

De Nat. Hom. Cap. 1. the natures of Vegitables, and ſome of Plants, and Animals, ὁ δημιυργὸς (ſaith he) μεταβαίνων, &c. which is, The Common Architect paſſing from irrational Creatures to that rational Animal Man, hath not effected this ſuddenly, but firſt has referred certain natural Knowledges, and Artifices, and Subtilties to other Animals, ſo that they appear near to rational Creatures.

Phyſ. Sect. 3. Membr. poſt Lib. 8. Cap. 4. *Peter Gaſſendus*, a moſt Skilful and Cauſe-Expreſſing Man, in his late Experimental Philoſophy, when he had enumerated very many Inſtances, by which the Cunning and Wonderful Sagacity of brute Animals were declared; and alſo the Epithets, whereby theſe kind of Animals are noted by Philoſophers, to wit, that ſome are called *Excelling in Knowledg*; others *Artificial*, theſe Dexterous and Compleat, or Crafty and Wiſe, at length the Author adds, that, *Theſe things could not deſervedly be attributed to them, unleſs they granted them a certain kind of Reaſon. However it be, we may ſeem at leaſt to be able to diſtinguiſh, by a ready way, that as Commonly a two-fold Memory, To wit, a Senſitive and Intellective, is diſtinguiſhed, ſo nothing forbids to Call Reaſon Senſitive and Intellectual. And truly, as we underſtand by the Name of* Reaſon, *the faculty or beginning of Ratiocination, and that to Reaſon is nothing elſe, than to underſtand one thing by the Knowledg of another thing, there is nothing more Eaſily to be obſerved, than that Brutes do Collect one thing out of another, or what is the ſame thing, do reckon or recount, and therefore are indued with Reaſon.* From theſe we may eaſily underſtand, what dignity, and beyond the powers of any Machine, cauſing its Efficacy, he affirms to be in the Souls of Beaſts. But in the mean time, if it be marqu'd, what Hypoſtaſis, or formal Idea, he hath aſſigned them; it doth not ſo Eaſily appear, how that ſuch Choyce Priviledges, do agree with thoſe Souls, ſo ſlenderly gifted, as to their Subſtances. For when from the Opinion of *Epicurus* he had ſhewn theſe to be Corporeal, and their Bodies to be made up of moſt light and round Atoms, out of which ſort fire and heat is Created; at length he Concludes; *The Soul therefore to be a Certain Flame, or a Species of moſt thin fire, which as long as it lives, or remains inkindled, ſo long the Animal lives; when it no longer lives or is Extinguiſhed, the Animal dyes.* But indeed, concerning his Hypotheſis, he ought to have unfolded, by what means this Fire *Intelligent* and *Artificial* (to ſpeak like the *Stoicks*) could be; or how a flame within certain bounds and Organs of the Body, however framed with the moſt excellent artificie, being inkindled and dilated, can be able to produce the Acts of the animal Faculty; This I ſay, moſt difficult Problem, this moſt Learned Man came to, and paſs'd over its Knot as it were purpoſely in that place.

Who aſſerts the Soul, to be a little flame, or a Certain fire.

CHAP. II.

The Opinion of the Author Concerning the Soul in General,

That the Soul of the Brute is Corporeal and Fiery.

Why the Soul of the Beaſt ſeems not to be an incorporeal, and immortal ſubſtance.

After having thus recited the chief Opinions of others, It now remains that we propoſe our own Opinion, or rather Conjecture, in ſo hard a matter. Where in the firſt place, I am not eaſily led to believe, That the Soul of the Beaſt is an Incorporeal Subſtance, or Form: For as to what relates to that *Platonick* Fiction, concerning the Soul of the World, that, and alſo the Hereſie of the *Manichees*, hath already been refuted and clearly exploded, both by the Ancient and Modern both Philoſophers and Theologiſts, that there remains no further diſpute about it. Further, neither can I Conſent to thoſe *Origeniſts*, who have affirmed the Souls of all Living Creatures to be immaterial, and alſo to ſubſiſt before and after their Bodies. For, tho I ſhould be little ſolicitous, for the almoſt infinite multitude of the more perfect Beaſts, which have liv'd, and do live, yet where do ſo many Myriads of Souls, even innumerable, of Inſects and Fiſhes, which are dayly produced, ſubſiſt, and what do they? The Bodies of very many of theſe ſerve only for Food to other Creatures. And for that the Souls to theſe Bodies, ſerve chiefly to preſerve them only for a little time, and as it were pickle them to keep them from putrefaction, there is no need that theſe ſhould be therefore immaterial and immortal. Beſides, when of old, *Egypt* was infeſted by Divine Puniſhment, with Swarms of Fleas, Flyes, and other Various Kinds of innumerable Inſects, and that the ſame alſo abounded every where, it is not eaſily to be Conceived, from whence ſo many Souls were ſo ſuddenly Called, and into what places, the ſame being by and by ſeparated, could be placed. Moreover, as Heaven, the Kingly Palace of the Great God, challenges for it ſelf Angels, *Gen.* 2. and pure Souls, free from all ſpot, to be its Inhabitants:

but

but the Earth, as it were a Certain ſink, draws forth and extracts the feces of things, and from its bulk, ruinous Bodies; it ſeems more agreeable to the fitted Oeconomie of the World, that all immaterial things (with the humane Soul, which we have noted to be placed in the Confines of Nature, that it might be the faſtning and knitting of either Syſtem) ſhould be aſcribed to the Air; but the other Animals, Condemned to the belly, and prone to the Earth, to this Glebe; ſo that the Souls of thoſe, may be ſaid to be born and dye with their Bodies, and to be altogether Corporeal. Yea if that Reaſons and Arguments of greater weight, fight for this Opinion, than thoſe we have ſeen on the oppoſite ſide; wherefore ſhould we not rather follow this, and paſs farther on into its parts?

It is ſhown that it is Material and Co-extended with the Body.

And indeed, that the Soul of the Brute, even as the inferior of Man, Is material and diviſible, yea Co-extended with the whole Body, ſeems to appear from many things; both firſt, becauſe we perceive many and divers animal Acts, to ariſe at once, from divers members and parts of the Body: For Examples ſake; in the ſame inſtant, that the Eye ſees, the Ear hears, the Noſe ſmells, the Tongue taſts, and all the Exterior members Exerciſe the ſenſe of feeling and motion, and in the mean time, all the Inwards and the *Præcordia* perform their offices. Wherefore, ſince there is no medium between the Body and the Soul, but that the members and parts of the Body, are the Organs of the Soul; what can we think elſe, or affirm, but that many and diſtinct portions of the ſame Extended Soul, actuate the ſeveral members, and parts of this Body? Beſides, it is ſeen in ſeveral living Creatures, whoſe Liquors, both the Vital and Animal (in which the Soul as to all its parts immediately ſubſiſts) are viſcous, and leſs diſſipable, that the Soul is alſo divided with the Body, and exerciſes its Faculties, to wit, of Motion and Senſe, in every one of the divided members, layd apart by themſelves. So Worms, Eeles, and Vipers, being cut into pieces, move themſelves for a time, and being pricked will wrinkle up themſelves together.

The Suffrages and Reaſons of very many Authors, perſwade that the Soul of the Brute, is not only Corporeal, but Fiery.

But that we have affirmed the Soul of the Brute to be not only Corporeal, and Extended, but that it is of a certain fiery nature, and its Act or Subſtance is either a Flame or a Breath, neer to, or a-Kin to Flame, beſides the large Teſtimonies of Authors, both Ancient and Modern, Reaſons and Arguments almoſt demonſtrative, have alſo induced me to it. Some of the Chief of theſe, we have of late Expoſed in the Treatiſe concerning the Inkindling of the Blood; there remains many others of no light moment to be added hereafter. As to what appertains to the ſuffrages of others, that I may not ſeem to ſtand upon the Authority of one *Gaſſendus*, who has maintained this Hypotheſis; I ſhall here Cite many both Ancient Phyſicians and Philoſophers. For not to mention *Democritus*, *Epicurus*, *Laertius*, *Lucretius*, and their followers; *Hippocrates*, *Plato*, *Pythagoras*, *Ariſtotle*, *Galen*, with many others, tho diſagreeing about other things, in this Opinion, to wit, That the Soul was either a Fire, or ſomething analogical to it, they all ſhook hands; to whom alſo have joyned themſelves of the Moderns, *Fernelius*, *Heurnius*, *Carteſius*, *Hogelandus*, and others: and lately *Honoratus Faber*, hath delivered in Expreſs words, *That the Soul of the Brute is Corporeal, and its Subſtance Fire it ſelf*: But indeed he far otherwayes Explicates his ſaying, than is propounded in our Hypotheſis. For having ſhewn this Soul to be material, and ſuppoſed all ſublunary matter to be nothing elſe but the four Elements, he therefore Concludes the Soul of the Brute, becauſe it is not ſeen to be any thing Compounded out of the reſt of the ſimple Elements, or of many of them, *That it is mere Fire*, *Tract. 2. l. 2. pr. 33. ad 38.* I ſhall take notice of one or two of our Countrymen. The moſt noble *Verulam*, chiefly diſtinguiſhes animals from inanimals, in this reſpect, for that the ſpirits of thoſe are otherways inflamed and inkindled, than the ſpirits of theſe. *Natur. Hiſtor. Cent. 7.* The moſt Learned and Famous Phyſician *George Ent*, in his Apology againſt *Pariſanus*, That Blood even as Fire, deſires two things, to wit, Food and Ventilation, hath moſt clearly demonſtrated. Wherefore, after ſo many Learned Men, it will be no Paradox to affirm, *That the Soul lying hid in the Blood, or Vital Liquor, is a certain fire or flame*; which Opinion agrees well enough with right Reaſon, as appears by what follows.

The more Ancient Philoſophers and Phyſicians have ſo affirmed.

Alſo many Moderns of great Note.

Hon. Faber. Tract. de Plantis et gener. anim. &c.

Arguments and Reaſons perſwade the ſame thing.

Indeed if Fire and Flame are to be defined or unfoulded, not by thoſe External accidents of burning, glowing, and of heat, (which are not its proper Paſſions) but by intrinſic Cauſes; we conceive very eaſily, the ſubſtances of them to be even as the Souls of the Brutes, or altogether of the ſame ſort. For truly, Fire, if we would deſcribe it according to its Eſſence, it ſignifies an heap of moſt ſubtil Contiguous particles, and exiſting in a ſwift motion, and with a continued generation of ſome, renewed by the falling off of others; which indeed Conſerves both its motion and ſubſtance; for that its Food, on which it continually feeds, is perpetually ſupply'd from the ſubject matter, which is Sulphur or ſome other nitrous thing in the Air, that Compaſſes it about; for from thence, out of the Food of either, the Particles being moſt minutely reſolved, and agi-

The diffinition of Fire and Flame by its Cauſes and Eſſences, agrees alſo with the Soul of the Brute.

tated

tated with a moſt rapid motion, the forms of Fire and Flame (which differ only in more or leſs) reſult. Since we have in another place diſcourſed largely enough of theſe things, it will not be needful to add any more here.

The Souls of all Brutes after the manner of Fire, want a two-fold Food, to wit, a Sulphureous and Nitrous.

What if we ſhould in like manner ſay, That the Souls of Brutes, are an heap of theſe ſorts of moſt ſubtle Atoms, heaped up together, and extreamly moveable? To wit, which being ſtirred up with Life into motion, as it were an infiring, Continue the ſame, and likewiſe its ſubſiſtance, ſo long as Nutriment, out of the appoſite matter, which is by degrees Conſumed, within Sulphureous, and without Nitrous, from the ambient medium, is granted to it. For that we ſay, That the Souls of all Brutes, ſo long as they live, and flouriſh after the manner of fire, do want Conſtantly either kind of aliment; to wit, Sulphureous and Nitrous: That this is true, is ſhewed hereafter, as well concerning Inſects and other bloodleſs Creatures; alſo concerning Fiſhes, and the more frigid bloody Creatures, as well as in the more hot and perfect Creatures, that have blood: Which Conditions however, are required to the Act and Subſiſtance of no ſubject beſides. But no motion, either of Fermentation, Ebullition, Vegitation, or of any other thing, (beſides Life and Fire) is immediately ſuppreſt, by reaſon of the taking away of the Air.

There are three things to be Conſider'd of Concerning the Soul of the Brute.

Concerning the Corporeal Soul in general, theſe Three things firſt fall under our Conſideration: *viz.* Firſt, What kind of Subſiſtence or Hypoſtaſis it is of. Secondly, In what its Life or Act conſiſts: And Thirdly, What are its primary Offices or Operations.

Its Subſiſtance or Hypoſtaſis.

As to the firſt, we may believe, That the Brutal Soul doth conſiſt of Particles of the ſame matter, out of which the organical Body is formed, but that they are choyce, moſt ſubtle, and highly active, which, as a flower ariſing out of the groſſer maſs, do mutually come together, and do conſtitute fit paſſages, which they produce thorow the whole frame of the Body, having got one continued Hypoſtaſis, to wit, very thin, and as it were Spirituous, and equal, and extended to the whole. For indeed, ſo ſoon as any matter is diſpoſed towards Animation, by the Law of Creation (and not by a Fortuitous Concourſe of Atoms) at once, the Soul, which is the form of the thing, and the Body, which which is called Matter, begin to be formed under a certain Species or Kind, according to the Model or Form impreſſed upon them. Wherefore, the more nimble and Spirituous Particles, rowling away from the reſt, heap themſelves together, and by leaſure grow Turgid. Theſe being thus moved, ſtir up others more thick, and diſpoſe them into deſtinated places, where they ought to ſtay and to increaſe, and ſo they frame the Body, according to its deſtinated Species. In the mean time, this heap of ſubtle Particles, or the Soul, which explicating it ſelf more largely, and inſinuating its Particles into other more thick, and weaving them together, frames the Body, and is exactly formed according to the dimenſion and figure of that Body, is Co-extended with it, and fitted exactly, as to a little Box or Sheath, actuates, inlivens, and inſpires the whole, and all its parts: Further, on the other ſide, the ſame Soul, being apt preſently to be diſſolved from it ſelf, and to vaniſh away into Air, is Conſerved by the Containing Body in its Subſiſtance and Act.

So indeed, the Soul, altho moſt thin, yet Corporeal, ſeems to be as it were the Specter, or the ſhadowy hag of the Body: Further, this ariſing together with the Body, out of matter rightly diſpoſed, receives its Hypoſtaſis or Subſiſtence, no leſs than the Body, according to the Idea or Pattern fore-ordained to it, by the Law of Nature; But altho intimately united to the Body, and is as its prop or ſtay, Yet being made of a moſt ſubtil texture, and as it were of a moſt ſlender thrid, it cannot be perceived by our Senſes, but is only known by its Effects, and Operations. Moreover, when as by reaſon of hurt hapning to it, or to the Body, that the Life of the Soul periſhes or is deſtroy'd, preſently its Particles being ſnatched away from the Concretion, or its mutual adheſion, they are altogether diſſipated, without any footſteps or marks left: In the mean time, the Body being made exanimat or Soul-leſs, by and by tends to Corruption, but indeed, if it be more groſs and more Compact, its Principles waiſting or unrolling themſelves leiſurely and by degrees, it is not Corrupted but of a long time.

In its Life or Act.

2. The Exiſtency of the Corporeal Soul, depends altogether on its Act or Life; and in this reſpect it ſeems moſt like to Common Flame, and only like it; to wit, for as much as the ſubſtance of either, as ſoon as it Ceaſeth from all motion, it is no more, and can by no means be made whole again in the ſame number. Wherefore, the Eſſence of this begins altogether from Life, as it were the infiring of a Certain ſubtil matter; to wit, when many active, and chiefly ſpirituous, and ſulphureous Particles, with ſome other ſaline, being prædiſpoſed to Animality or Life, come together, in a fit Furnace or fire-place, take Life, ſometimes being as it were inkindled by another Soul, ſometimes of their own accord, which, from thence being ſupplyed, conſtantly (as we have ſaid) by a ſulphu-

ſulphureous food within, and a nitrous without, Endures for ſome time; until at length, by the defect of Either of theſe, or by reaſon of ſome Violence or Injury happning outwardly, the ſame as it were being Extinct, periſheth quite. The Act of the Corporeal Soul, or the inkindling of the Vital matter, in the more perfect Brutes, being indued with an hot Blood, appears ſo clearly and openly by noted heat, by the Exhalation of its fumes or ſut, with other Accidents and Effects proper to the Kitching flame, that any one Conſidering or weighing them, may well believe that the blood doth truly flame forth, and that Life is not ſo like to flame, but even a flame it ſelf, as we have formerly ſhew'd at large: But indeed in others leſs perfect or frigid Animals, altho we do not ſay the Soul is properly flame; yet (which is next to it) we ſay it is a moſt thin heap of ſubtil Particles, and as it were fiery, to wit, a certain ſpirituous breath; this being ſhut up in the Body, agitates its thick bulk, actuates all its members, and arteries, and in ſome with wonderful agility, goes thorow and inſpires the ſame, more than in the more perfect animates, as appears in ſome Reptils and Inſects. Further, that there is a firey Vigor in theſe Kind of Souls, may be even Collected from hence, becauſe, whilſt they live and do not lye aſleep, they have no leſs need of Food and acceſs of Air, than the more hot living Creatures; as ſhall be declared anon.

3. As to the Operations in General of the Corporeal Soul, we ſay, That as ſoon as it Exiſts in Act, that it performs chiefly theſe two offices; *viz.* Firſt, to frame the Body as it were its domicil or little houſe, and then that Body being wholly made, to render it apt and fitted to all the Uſes neceſſary both to the Kind, and to the Individuum: for which Uſes it is furniſhed with a manifold Guard or Company of Faculties or Powers; alſo according to the Various inſtincts and ſuggeſtions of Nature, it exerts or puts forth as it were predeſtinatedly the Acts of a Various Kind, altho almoſt after the ſame manner. It will not be an eaſy matter here to rehearſe, all the natural Powers and Habits with which all Corporeal Souls are wont to be gifted, to wit, becauſe they are not in all after the ſame manner; But as living Creatures are more or leſs perfect, ſome than others, alſo according as they being deſtinated for the Various Scene of this worldly Theatre are diverſly figured, and ought to live, their Souls alſo are furniſhed by a divers manner of proviſion of Faculties: The ſpeculation of theſe things, tho very pleaſant and profitable, is too copious and large for us to divert our ſelves within this place; But for the illuſtrating of our Pſychelogie or Doctrine of the Soul, it may not be amiſs to recite the chief Kinds of Living Creatures, and to reduce them as it were into certain Claſſes or Forms, and then to deſcribe their Chief Species, together with the Various degrees of the Souls, that inhabit them.

In its Offices and Operations.

CHAP. III.

The Various Kinds of Brutes, together with their reſpective Souls, and the chief Species of each of them, are rehearſed and deſcribed.

FOr as much as the Brutal Soul ought to be proportionate to the Organical Body, it eaſily follows, that as there are Various kinds of Bodies, in the divers Habitacles of this world, and offices of thoſe Bodies deſtinated to life, ſo alſo Various Souls, by which they are actuated, do exiſt, and are indued with a Divers Gift of Faculties. If we would conſider the perfect Sence of theſe, it were firſt needful to write the Hiſtory of all Animals, and to deliver the Anatomy of each of them. But as that will be a buſineſs of an immenſe and tedious labour, it ſeems much more to the purpoſe, to reduce here, all the Bruits to certain Kinds, according to ſome certain affections in many of them, and thence to deſcribe ſome chief Species of thoſe Kinds, and their Various Compoſitions and Structures, in reſpect of the Vital parts.

Animals are reduced into Claſſes either according to the Organs of Reſpiration, Or according to the Vital Humour; and they are either without Blood, or of frigid Blood, or hot Blood.

Living Creatures may be diſtinguiſhed or reduced into certain Claſſes, either Firſt, according to their Various Organs of Reſpiration, which in ſome are numerous Branchiæ or Gills, and theſe diſperſed thorow the whole Body, as in many Infects, or they are appropriated Branchiæ or Gills, in Fiſhes; or laſtly, Lungs, common beſides to divers animals, with Man. Or ſecondly, the rehearſal of the Brutes may be made according to the Various Conſtitution of the vital Humour, in which reſpect, they are either Firſt, without Blood, or Secondly, of a leſs perfect or frigid Blood, or Thirdly, of a more perfect or hot Blood: And to this partition, as the more Known, inſiſting here, we ſhall run thorow the ſeveral members of it in Order, and briefly Notifie in them the Fabricks of the

the chief Vital parts of the Body, and the Conſtitutions of the Souls, Inhabiting them.

Bloodleſs Creatures are either of the Earth or Water.

Firſt, Bloodleſs Creatures, are either belonging to the Earth, in which number are very many Inſects; or belonging to the water, of which Kind, beſides ſome certain Kinds of Inſects, are alſo found various Fiſhes, which are wont to be divided into Soft, of which ſort are the Cuttle Fiſh, the Sea Woolf, *&c.* Shelly, as Oyſters and Cockles, *&c.* And Pargated or other thinner ſhell'd Creatures, as the Lobſter and Crab: We will examine in either ſort, ſome chief Species of theſe Bloodleſs Creatures, as to the States of their vital Parts, and their Souls.

It appears that Inſects have fiery Souls, becauſe they want Sulphurous and Nitrous food.

Firſt, Therefore in earthly Inſects, altho indued with a ſmall bulk that they have great Souls, their Actions teſtifie, which indeed are performed by ſome of them, as the Silk-worm, the Bee, the Ant, or Emmet, the Spider, to admiration: Further, That the Souls of theſe are of a certain fiery nature, no leſs than thoſe of the more hot and perfect Brutes; we from hence deſervedly ſuſpect; becauſe they ſtand in need of a Copious Food, after the manner of an inkindled Flame, and of the acceſs of much Air. The firſt appears by common Obſervation, for as much as Inſects often devour all the Corn, and Leaves of Plants, and ſo take away the grateful greenneſs of the Summer. Beſides, it appears from hence, that their Lives require a conſtant afflux of Air, becauſe as it hath been experienced by our noble Mr. *Boyle*, Inſects being put into a glaſſy Globe, quickly dye, after the Air is ſuckt out. This the Learned *Malpigius* hath more fully declared in his moſt ingenious Tract of the Silk-Worm: where he Obſerves, *That Inſects have not only Lungs, but ſo abound in them, that every little ring or ſection of them is indued with two, yea and that every part alſo of the* Viſcera *or Inwards, delight in the derived Lungs.* For as in the ſides of Inſects, the whole length of the Body on both ſides, black ſpots or pricks appear, he hath found, that theſe were indeed tunnels or breathing holes, leading from ſo many Wind-pipes or aſper Arteries, which by and by, being branched forth into the Heart, Ventricle, Spinal Marrow, and all the other Inwards, and Internal parts, carry in and out air to and from them all. Moreover, if theſe orifices be all ſmeared over with Oyl, or Hony, the Worm preſently dyes; but if only a part of thoſe breathing holes be ſo ſtopped, the neighbouring parts being by and by Convulſed, and then reſolv'd or looſned, ſink down or flag, the reſt keeping their motion: But if the orifices of the *Trachea* or Wind-pipe be untouched, and that the Head, Mouth, Belly, or any other parts be ſprinkled with Oyl, neither death nor any trouble of the Senſe will be induced; and what is yet more wonderful, the Inſects that have oyl or the like poured into their Wind-pipes, ſo ſuddenly dye, that tho the Heart keep a motion for ſome ſpace, yet they can never be revived. Theſe *Phænomena* happen alike not only in the Silk-Worm, but in Waſps, Bees, Graſs-hoppers, Locuſts, Caterpillers, and other the like Inſects, which certainly, I believe, gives very much Light concerning the uſe of Lungs, in every Animal: But firſt let us inſpect ſome other Parts of Inſects, deſcribed by a moſt accurate Anatomy.

Malpigius de Bombyce, p. 28.

Theſe have Lungs, or numerous wind-pipes, the Orifices of which, if ſtopped up by Oyl, preſently death follows.

The Heart of the Silk-Worm is long, unequal and ſtretch'd forth thorow the whole Body.

Therefore he ſays in the Silk-Worm, and the like in others, That the heart is placed all along the Back, between the Muſcles and the Lungs, here and there appending, and that it is ſtretched forth from the top of the Head to the extreme part of the Body; This conſiſting of their Membranes, as appears as it were one Tube or Pipe, but unequal, to wit, ſometimes broader ſometimes narrower, continuing from the Tail to the Head, ſo that for their inequalities, they ſeem as ſo many Eggs, or little Hearts, one laid by another, and continued by one paſſage. Theſe little Hearts, or the aforeſaid parts of the Heart, do gently drive forward, not at once but ſucceſſively and ſlowly (after the manner of their membranes) being bound and dilated from heart to heart ſometimes upward, ſometimes downward, the contained vital humour, which is limpid or clear, and ſo (as we may believe) a certain portion of the vital humour, being ſqueezed forth into the Arteries (which are ſo ſmall and few, that they cannot be ſeen) is agitated by the Circulation of the reſt, contained almoſt only within the oblong Cavity of the Heart.

The Brain is wanting, the Spinal Marrow being ſufficiently large.

As to the head, this moſt diligent ſearcher obſerved, that Inſects had no Brain within the Skull, its Cavity being filled with the Muſcles of the Eyes, and ſome others, but its ſpinal Marrow ſufficiently large, and divaricated in many places, for the going out of the Nerves, and as it were protuberated with knots, is extended from the Head to the Tail; and what is worthy to be noted, in the whole paſſage, branches of the Trachæa or Lungs were ſuperinduced to this ſpinal Rope, and inſerted to it in very many places. I omit what he moſt learnedly diſcourſes of the members, ventricle, and other Inwards of Inſects, leſt it ſhould ſeem impertinent, or too much Plagiariſm: But that the diſcourſes may be the better underſtood, concerning the vital parts of Inſects, it will be convenient here to borrow the draughts of the heart of the Silk-Worm; and of the Trachæa or Wind-Pipes, both of that and of the *Graſs-hopper*, and Locuſt (in which the Tra-

chæa

chæa or Wind-pipes are like to other Inſects) moſt diligently delineated by *Malpigius*; which ſhall be added at the end of this Chapter, with other Figures of other Animals; but theſe the firſt Table ſhews. Further, as to what belongs to the Doctrine of the Soul, we may with the Authors lieve Philoſophize, or at leaſt conjecture, concerning the Phænomena of the Heart and Lungs by him deſcribed.

The Uſe of the Parts is expoſed.

Therefore, for that Inſects firſt having ſuch copious Lungs diſperſed thorow all the Viſcera or Inwards, Heart, and ſpinal Marrow, to which that each might come diſtinctly, they have many diſtinct Trachæas or Wind-pipes, with ſo many gaping orifices, on the ſuperficies of the Body, it appears from hence, that the uſe of the Lungs in theſe little Animals, is not for the refrigeration of the Blood, or its exact miſtion, nor for the ſuſcitating the motion of the Heart; becauſe, neither the Veſſels carrying the Blood or Vital Humour, accompany the Trachæa or Wind-Pipes, nor is ſuch a humour to be rapidly Circulated, but ſeems to be only carryed and placed gently into all the parts.

Why ſuch numerous Wind-pipes.

But that the orifices of the Wind-pipes being ſtopped, preſently Life is extinguiſhed in theſe (as alſo in a glaſſy Globe empty of Air) what can one imagine elſe, but that this acceſs of Air, is required for the ſuſtaining of the Vital Flame, as it is wont to be for that of the Chimney? Wherefore, becauſe the vital humour (which is not at all or only ſlowly Circulated) cannot be carried all quickly to one Fire-place of accenſion, as in more perfect Creatures, therefore very many Lungs gaping every where outwardly, and diſperſed every where inwardly, are framed for the bringing of Air to the ſeveral portions of the vital humour, planted on all ſides; for that not only the Heart, but alſo the Ventricle, Genitals, ſpinal marrow, and all the other parts of the Soul diſperſed, growing with a kind of ſilent Fire, are inſpired with the admitted Air, to every one a part.

Wherefore the Heart is ſo long.

Beſides, when as the vital humour cannot be Circulated into all the other parts, and from theſe into that, with a rapid motion therefore, inſtead of a Conick Muſcle, which receiving the watering juyce, may be able to explode it preſently, and to caſt it forth a great way on every ſide, a Tube or as it were a membranaceous Sack or Bag is made, to wit, which by a long tract ſtretching it ſelf nigh to all the parts, and to which it might by degrees beſtow what might ſuffice, and in the mean time g ently moving the proviſion chiefly contained in it ſelf, preſerves from ſtagnation or putrefaction. Further, the little Branches of the Trachæa, deeply inſerted into the Membranes or Coats of this, inſpire or rather inkindle the humour contained with vitality.

Bloodleſs Creatures belonging to the Water.

As to the aquatick bloodleſs Creatures of the other kind, *viz.* ſome ſoft Fiſhes, alſo many, perhaps all ſhelly and cruſty Fiſhes; I have not yet happened to ſee the former, but *Severinus* being my Author, the *Sepia* or *Cuttle* Fiſh is made with an heart and gills, and the *Polypus* or *many feet* with it and Lungs: what is to be met with that is more curious in the framing of them ſhall be omitted. Concerning the other two Fiſhes, to wit, the ſhelly and cruſty, we ſhall add ſome Anatomical Obſervations, ſuch as we have ſearch'd out in their vital parts, and other beginnings, truly weighed, and what the ſouls are of theſe ſort of bloodleſs Creatures.

Soft Fiſhes.

The Anatomy of the Oyſter.

Of the teſtaceous or ſhelly, though it hath been diſſected by many, we ſhall make choice of the Oyſter. The body of this Fiſh, though it ſeems rude and wholy without ſhape, yet it hath all its Viſcera and parts, and eſpecially the Præcordia, for, as it were the hearth and Tunnel of the Vital Fire, moſt curiouſly framed. As we ſhall deſcribe ſome of the chief of theſe, we will begin with the ſhells, which are born with them, from Eggs, and are firſt ſoft, and as they encreaſe in bulk they are by degrees hardned: A robuſt Muſcle being implanted in the middle of the Oyſter, grows by its tendons to either ſhell. The moving Fibres of theſe (which ſeem as it were a little bundle of Chords or Strings) aſcending rightly, whil'ſt they are drawn together, ſtrictly ſhut up the ſhells; but being relaxed, they ſuffer them to be opened and lifted up; to which Office of opening the ſhells, another Muſcle adjoyned to this, is required. Beſides theſe upright Muſcles, and perpendicular to the planes of the ſhells, there are two Circular, ſtretched forth by the brims of either ſhell; which in the ſame place comprehending in themſelves Gills, ſerve chiefly for their motion; as we ſhall ſhew by and by.

The Muſcles opening and ſhutting the ſhells.

Circular Muſcles moving the Gills.

The Mouth of the Oyſter.

The Ventricle of the Oyſter.

The Liver and Meſentery.

On the top of the Oyſter, the Circular Muſcles being united, make a thing as it were a Vail for the covering of the head; then being a little divided below, they include four ſuperiour Gills: In the middle of which, a gaping chink leads by an oblique proceſs to the mouth of the Oyſter. From the Mouth there is a ſhort and ſtrait paſſage to the Ventricle. The Cavity of this large enough, is endued with little holes, leading into darkiſh bodies, fixed on either ſide of it. Theſe bodies ſeem to be in the ſtead of the Meſentery and Liver, and to perform their offices; to wit, for that they receive

the more pure part of the Chyle, by and by from the Ventricle, and deliver it, being made clear from dreggs, to the vital humour. The like is in cruſtaceous Fiſhes, and perhaps in ſome Brutes; to wit, in ſuch as a ſimple and only Inteſtine, without folds and Meſeraick or milky Veſſels, is produced from the *Pylorus* to the great Gut or Ars-hole.

The Inteſtine.

For ſo in the Oyſter, the Inteſtine beginning from the bottom of the Ventricle, deſcends with a plain and equal Tube, towards the right Angle of the ſtreight Muſcle, where being rolled and retorted in it ſelf, it aſcends again towards the Ventricle and Liver; being from thence demerſed, and bending back towards the left ſide, goes towards the border of the ſtrait Muſcle, till it ends in the great Gut or Arſ-hole: After this manner in the Oyſter, a ſimple and only Inteſtine is carryed about, with a moſt long compaſs, more than in many other Animals, by which indeed they may be able the longer to retain their Dung; to wit, leſt that when they are dry, that being more importunely put forth ſhould polute (by mixing with it) the water, for the food of life, included in the ſhell.

An Inteſtine in an Inteſtine. Which perhaps is the Spinal Marrow.

This Inteſtine being diſſected and opened longways, in the bottom of it ariſes an hardiſh and almoſt round body, which aſcending from the Arſe to the Ventricle ariſes there, and ſtretches under the *Oeſophagus* towards the Head: The like to this is found in a Worm, which hollowneſs in it we think to be in the place of the Meſentery and milky Veſſels: but otherwiſe in the Oyſter, this hard and compacted body being leſs apt for ſuch an office, ſeems not unlike to the ſpinal Marrow: But we ſhall ſhew the Chyliferous paſſages do ſupply the darkiſh bodies, hanging to the Ventricle.

Its Pericardium with the Heart and Veſſels.

Below the Ventricle, the *Pericardium* is placed, including the Heart, being whitiſh with a large black ear, which being opened, that is beheld to beat, and at every *Diaſtole* to admit the vital humour, out of the hollow vein, into the little ear; then at every *Syſtole*, to drive the ſame forward into the *Aorta*, placed on the contrary ſide; then by tripartite branches of this Veſſel, a certain part of this humour tends upwards, towards the Head, Liver and Stomach; alſo a certain portion is reflected into the ſtrait Muſcle; in the mean time a great part of it being delated from the great Trunk of the Artery, to the *Branchiæ* or Gills, it is there unfolded, within moſt ſmall and numerous paſſages, as it were little Rivers, that it might enjoy, according to all its parts, little nitrous bodies inſpired from the water. And that this may be the more plentifully done, we obſerve that the water, as in bloody Fiſhes, did not only waſh the outward ſuperficies of the Gills; but that it every where did enter all the more intimate receſſes, and deeper paſſages; yea theſe Gills expanſed largely thorow the Hemiſphere of the Oyſter, exceed in bulk, all the other Viſcera, alſo almoſt the parts. So that in Fiſhes, becauſe they breath but little in the water, it is ſo provided that in many places together, the food of reſpiration ſhould be afforded them.

The Gills.

The Deſcription and uſe of them.

There are Four hairy tufts of Gills, and as it were two Lobes of either of them; to wit, the upper more broad and thicker, and the lower which is thinner and a little more contracted; in all the paſſages of them, every one is two-fold, and contains two ſeries of little Finns, ſeen to grow together; to the ſeveral Gills belong two Veſſels, the Artery and the vein; which being depoſited in the heaps of the hairy tufts, diſpoſe the ſmall ſhoots of either kind thorow all the borders. But beſides theſe Four orders of Veſſels, there are found alſo ſo many ſeries of little breathing holes, lying between theſe Veſſels; which alſo by manifeſt paſſages open in the places between the Finns: and from thence they deduce the waters ſup'd up by the inferiour mixture or joyning of the Circular Muſcles: The like is in cruſtaceous Fiſhes, as we ſhall ſhew by and by.

The motion of the Gills depends upon the Circular Muſcles.

As to the motion of the Gills, it is clear by ocular Inſpection, that the Circular Muſcles, which are knit to either ſhell, for the ſhutting them, when relaxed, do reach to the extream brims of the ſhells; whereby at that inſtant, alſo the Gills being relaxed, they imbibe the Waters, and together from them draw the nitrous food; and by and by being contracted, they are drawn inwardly, and together compel the Gills, to the preſſing forth the Waters newly admitted.

Shelly and cruſty Fiſhes, contain waters in their whole bodies, to wit, whereby they may be able to live out of the Waters.

If the Reaſon is asked, why ſhelly Fiſhes (which alſo holds with the cruſtaceous, as we ſhall ſhew anon) have beſides the Veſſels carrying about the vital humour, alſo Paſſages or open Chanels, by which the Waters are carried to their moſt intimate receſſes; it ſeems to be becauſe both theſe ſorts of Animals, though they reſide at the bottom of the Sea, yet oftentimes they happen to remain dry, therefore that they might then breath (the moſt wiſe Creator ſo providing) they contain plenty of water within their own frame, as it were repoſed in Wombs; by the during proviſion of

which,

which, they live as well in the open Air, as in the Waters; But these Waters being taken away, shed, or evaporated by heat, both these sort of Fishes quickly dye: By reason of these Waters, these live longer then others out of the Waters. Further, as the Noble Mr. *Boyle* hath observ'd, the Oyster and the Sea-Crab, being put into a Glassy Globe, after the Air was suck't forth, did not presently expire like many other Animals; to wit, because part of the Intestine Water being rarified, quickly supplyed the defect of the exhausted Air; at least, that being detained within the proper frame of the Fish, affords an inkindling or matter for respiration. It is sufficiently known, that the Oyster, when it is taken out of the Waters, hath a great quantity of Waters shut up within its shells: as also the Lobster (which we intend to consider of among the crusty Fishes) doth the same thing, as shall be declared. In the mean time, for the illustration of this our Anatomy of the Oyster, *Tab.* 2*d*, shews the Figures of its parts aptly represented.

The parts and Viscera of Fishes swiming backwards are inversed.

The *Lobster* and other Fishes a-Kin to it, *viz.* the *Crab*, *Sea Creevish*, *Shrimps*, &c. As they retrograde, or rather swiming backwards, so their parts and Viscera in respect of other Animals, seem to be inverse or opposite: For as to the members and moving parts, the bones are not covered with flesh, but the flesh with bones: wherefore, almost all the Muscles of the Feet, Arms, Head, Back, Tail, and other parts, either moveable or moving (excepting those that are temporal) are shut up every where with a crusty covering; Indeed it is so ordained by Divine Providence, that as these Animals inhabit among Rocks and sharp Stones, lest they should be in danger of being dashed too hard by the force of the Tides, they are fortified with Bones, planted outwardly, as it were with Armour: Moreover, lest that the crusty Covering should more sharply compress the Membranes, or the Flesh underneath, or should rub against them, the same is every where covered within with a thick Purple Muck or Stuff, as it were lined with a soft cloath: I do believe this purpuling in crusty Fishes, otherwise than in soft (who also are besmeared with muck) to happen through the greater plenty of Sulphur.

As their Bones and Flesh, so their *Præcordia* and *Viscera*, are observed to be *Histeron Proteron*, topsie turvie; for the Liver, Stomach, and Womb is placed above, and the Heart below, yea contiguous to the Back: yea, and the spinal Marrow lyes not close to the Back, and above the Viscera, but under them, and to the prone part of the Body, in its whole passage; and is included in the bones or jointings of the Sternon, or meeting of the Breast.

The Brain of the Lobster.

But that the Parts and Viscera of the Lobster may the better be beheld, let the armed coat with the red Muck and Membrane lying under it, be taken away; then in the top of the head, appears the Brain but meanly large, of a greenish colour, and as it were two-fold; from which the mammillary Processes, and the Optick Nerves ascend,

The Nerves and spinal Marrow.

and two shanks of the oblong Marrow descend into the spinal Marrow, and in its whole process, they are sometimes divided, and sometimes placed togethet, now united, and then again seperated one from another.

The Oesophagus.

The *Oesophagus* tends from a two-fold mouth, by a strait and short passage, into the Ventricle, this large indued with a thick and strong Membrane, has three Teeth within its Cavity, by which its aliments are chawed or bruised: further, for the work of Chawing and brusing, two pair of muscles are framed, in the neighbouring parts, to wit, one temporal or belonging to the Temples, and another hanging to the sides of the Stomach;

The Ventricle from which there is a passage into the Liver and Messentery.

from the sides of the Stomach or Ventricle, grow too glandulous Bodies, stuffed with many Vessels and various passages, as it were certain little thin Intestines, and from thence being by degrees sharpened with two Lobes, they descend into the lowest Trunk of the Body; from the Stomach into these Bodies, on either side, passages lye open, so that wind being blown into it by a Pipe, presently it runs into these and makes them swell up: These parts in crusty Fishes (as also in the shelly) are commonly called the Liver, and indeed they seem to perform the Offices both of the Liver and Messentery; to wit, for as much as they receive the more pure portion of the Chyle fresh digested in the Ventricle, and commit that by and by, being made purer, to the vital humour. *Malpigius* observes in the Silk-Worm, and in other Insects, that

De Bombic. p. 40.

certain diversified Vessels, analogical to these Bodies, are stretch'd out through the back of the Ventricle, and from thence to reach lower upon the Intestine; which (as he probably thinks) receive the more thin portion of the meat already macerated and loosned in the Ventricle; and deliver it, the juyces perhaps being not much changed, to the Heart, or at least to the Skin and other parts of the Body. Truly by

Things answerable to the Liver and Messentery in Insects.

observation, after what manner these parts which supply the place of the Liver and Messentery, in some Fishes and Insects are made; something may be thence gathered concerning the uses of the Liver, and of the Vessels both Miseraick and Milky, in

bloody Brutes.

Spermatick Bodies. In the Male Lobſter, above the beginnings of the aforeſaid parts, on either ſide, from the ſides of the *Oeſophagus*, the ſpermatick Bodies begin, which being ſent down towards the bottom of the Trunk, and there being more compacted and made ſmoother, after the likeneſs of the *Epididimis* or thin covering of the Teſticles, are terminated in two Yards; the Tops of which have their going out thorow holes forged in the laſt little feet but one. In like manner in the Female Lobſter, two neſts of Eggs on either ſide of the ſides of the *Oeſophagus* and Ventricle are placed, and paſs into two Wombs planted in the loweſt Trunk of the Body, and into thoſe, thorow the holes forged in the laſt little Feet but one, there lyes a paſſage to the genital Members, alſo a paſſage from the Womb for the laying of Eggs: ſo that it appears how theſe living Creatures are moſt fruitful, with a multiplyed Iſſue; when as nature ſeems to be careful and induſtrious about their genital parts, being double and greater than in many other Brutes; to wit, that as they being both at once double, they might produce both by the works of Generation, Conception, and bringing forth not only always Twyhns, but almoſt *Miriads* of *Twynns*.

Two Yards in the Male.

Two Wombs in the Female.

The Pericardium and Heart. Below the Ventricle, yea and lower alſo then the beginnings of the other Viſcera, the *Pericardium*, in which the beating heart is included, is placed in the bottom of the Back; the *Syſtole* and *Diaſtole* of the heart are ſtrong and ſwift, as in Creatures of Blood; this appearing of a whitiſh Colour, is indeed a *Conick* Muſcle, whoſe Cavity being ſufficiently large is framed with Fibres or Columns, alſo with many ſtrong and various little Furrows: The *Aorta* going forth from its top, is cleft preſently into two Branches, which go towards the Gills; The *venæ cavæ*, one aſcending, the other deſcending, meet together from the bottom of the Heart, and there enter into its little ear. The Heart whilſt it is relaxed, receives the vital humour from the vein, and by and by when it is contracted, drives it forward into the *Aorta*.

The Aorta.

The Gills. The cruſty Fiſhes, even as the ſhelly altho without Blood, are indued with numerous and large Gills, which are inſtead of Lungs; to which, that all the Vital humour may be frequently carried, therefore not as in earthy Inſects, are they diſperſed thorow the whole Body, but on either ſide, under the brim of the armed coat, and being gathered together in one place, are made into certain little bundles: The inferiour and utmoſt part of the Gills, which are broad and obtuſe, is fixed to the *Sternon* or meeting of the Breaſt, with hanging little feet; the upper part aſcending under the Coat is looſe and free, and by degrees grows ſharp; otherwiſe than in Fiſhes with Blood, whoſe Gills are tyed together, being ſolid at either end.

The Gills of the Lobſter have three Boſoms. In all the Gills of the Lobſter, Three Boſoms are found, of which two ſeem to be made for the carrying in and out of the vital humour; becauſe a black Liquor being injected into the heart, paſſes to the Gills, and there paſſing firſt thorow one Boſom, returns by and by thorow the other. We will ſpeak by and by of the third: from theſe Boſoms appear productions of ſmall Veſſels, as if it were feathery, ariſing on every ſide, thick ſet and ſhort, like jagged welts or fringes; which being ſpongy, ſup up the Waters continually flowing to them, at every turn of the *Diaſtole*, and preſs them forth by *Syſtole*: to wit, for the end, that whilſt it is there unfolded within the ſmall paſſages, the food for the vital humour may be inſpired. The Third Boſom being carried from the top of every Gill, to its Baſis ends in the common Channel, in all the Gills of the ſame ſide, which nigh to the inſertion of the higheſt Gill (which beats perpetually) gapes with a large gap; Any one may eaſily perceive this, in a live Lobſter, whilſt it breathes out of the water; for in every *Syſtole* or pulſe of this ſupream Gill, one may ſee a bubble of water break forth out of that hole. Further, if into that hole a black Liquor be injected, by and by entring under that Common paſſage, it paſſes thorow from thence, both into all the Gills, and the ſmall and feathery Boſoms of them, and alſo into the Arms, and all the little feet (the Cavities of which the Muſcles do not fully ſtuff) yea, and into the Cavity of the Body. In like manner wind being blown into that hole, all the aforeſaid parts will be inflated or blown up.

Two of theſe carry about the Vital Humour.

The third receives, and caſts out the Waters flowing to it.

Shelly and Cruſty Fiſhes receive the Waters, that when they remain dry, they may be able to live. From hence we may gueſs, that hole, with the common channel, and the three boſomes of Gills, to be a certain *Trachea* or Wind-pipe, into which plenty of water entring at every *Diaſtole*, is returned back at the next *Syſtole*: In the mean time, theſe waters in this paſſage, do not only Communicate with the Vital Humour, abounding between the Gills, but beſides, are laid up between the Cavities of the Members and the Trunk, that they may ſupply theſe Fiſhes, whilſt they are kept dry with matter for reſpiration; and therefore, they not only longer ſubſiſt in the open air, but alſo live for ſome time in a place void of all air.

In Cruſty Fiſhes, for that, for the agitating the Gills as it were with Lungs, the Ribs belonging to the Sides, the Muſcles of the Breaſt, and other things are either wanting,

or

or by reaſon of the ſtiffneſs of the neighbouring parts, are made unable; it is performed by an admirable artifice, as whilſt the Gills, for the moſt part being looſe, and are left eaſily moveable, the ſeveral little bundles of them, about the baſis of the beny little Foot, being included with the Muſcles, within their Cavities, as it were ſo many hanging Ribs, are fixed, being drawn forth far beyond the Trunk of the Body; which, as ſo many diſtinct Pendulums, by the help of the Muſcles, which they include, being almoſt continually ſhaken, cauſe alſo continual *Syſtoles* and *Diaſtoles*, for the inſpiring and exſpiring of the Gills.

The Gills of Cruſty Fiſhes, hanging from the Sides or Ribs, are moved as it were by ſhaking Pendulums.

But it may well be doubted, whether we ought to aſſign Souls of the nature of fire, to theſe bloodleſs Creatures inhabiting the waters; becauſe they rejoyce in an Element that is deadly to fire it ſelf, and to the Lives of more perfect Brutes: But this Problem ſhall be ſatisfied by and by, when we have firſt diſcours'd of the Uſe of the Gills in Bloody Fiſhes, as alſo concerning the *Præcordia* of theſe, and others, of a more frigid blood: In the mean time, the Third Table ſhews the Figures, repreſenting to the Life the parts of the Lobſter.

Whether there be fiery ſouls in bloodleſs Creatures.

Secondly, After the bloodleſs Brutes, their ſecond Claſs, and of a little higher degree, is that of the more cold bloody Creatures; in which for that the vital Humour or Liquor, being dyed with a reddiſh tincture becomes bloody, it ſeems to proceed from a greater plenty of Sulphur, and chiefly deſtinated for living Creatures, for the increaſing their bulk and ſtrength: For where blood is, though in a mean Plenty, their Muſcles, Inwards, Præcordia, Brain and more ſtrong and compleat Organs of the ſenſes exiſt. We have obſerved it otherwiſe among moſt Inſects, whoſe little Bodies being ordained to ſubtle and ſmall actions only, are made up of very little Sulphur, as their *Analyſis* or the unfolding them ſhews, but of plenty of Spirit and of volatile Salt.

From whence the vital humour becomes bloody.

But that among the Bloody Brutes, ſome are hot in Act, and others are frigid or cold, the reaſon may be, both from the quantity of Sulphur, to wit, with which they are only meanly or very much imbued, alſo from the Kind of life which they live, either in the Air, or in the Waters, or within the Earth: Wherefore, the Inhabitants of the latter Regions do not grow hot in the Act, yea 'tis ſcarce poſſible they ſhould; for how, or which way ſhould heat ſubſiſt, where it is in danger to be damped or overthrown by a more potent Cold? Wherefore, the blood of Animals deſtinated to theſe places, is tempered with little Sulphur, leſt otherwiſe growing hot above meaſure, it ſhould be forthwith ſuffocated; yea and we ſuſpect the Souls of theſe, tho of a firy nature, to have not a flamy *Hypoſtaſis*, but a breathy, to wit, which conſiſting in Vapour, hardly or not at all inkindled, like an *ignis fatuus* or falſe fire, is deſtitute of ſenſible heat.

Why the bloody Brutes, are ſome of them more hot Animals, others more cold.

The more Cold bloody Creatures, altho all of them have a *Conic* Heart, very fibrous and thick, to wit, that being ſtrongly Contracted, it might drive forward the Vital Liquor, by a certain Circulation, into all the parts, and from them into it ſelf: yet this Heart in ſome is two bellied, and to it always the Lungs are hung; in others it hath but one belly; and in many, in the place of Lungs are Gills, but in ſome there are numerous Wind-pipes, and diſperſed thorow the whole Body: We ſhall conſider the different ways and buildings in each of theſe.

Why ſome are indued with an heart, with a twofold Belly & Lungs; others with one Belly, and Gills, or Wind-pipes diſperſed.

Among the Brutes of Cold blood, The Earth-Worm, tho of the loweſt order, may be rightly placed; for that its humour appears by occular inſpection to be bloody: This little living Creature, tho it be eſteemed Vile and Contemptible, hath allotted to it vital organs, as alſo other *Viſcera* and Members, made moſt admirably by a Divine Workmanſhip; the frame of the whole Body (even as of many bloodleſs Infects) is a chain of ringie Muſcles, the orbicular fibres of which being Contracted, render every Ring firſt large and dilated, and then more narrow and longer. For then, when the ſuperior portion of the Body being made long and ſtretched forth, is extended to a further ſpace, and is there affixed to the plane, the inferior portion of the Body, being relaxed and abbreviated, is eaſily drawn to it, as to its Centre. A four-fold ſeries or rowes of little feet are placed thorow the whole length of the Worm; with theſe, as it were with ſo many hooks or claws, he fixes now this part, now that, to the plane or ſuperficies, whilſt he ſtretches forth the other, or draws it after him. Above the opening of the Mouth, he is indued with a ſnout, with which he diggs thorow and thruſts up the Earth.

Deſcription of an Earth-Worm.

Its local motion.

The little Feet.

Its Snout.

The Earth-Worm, being laid on its back, and fixed with Bodkins to a Table, let it be cut up long ways, then the Sides being layd apart, its parts from the head to the tail eaſily ſhew themſelves to your view. Above the opening of the Mouth, the Brain appears in a very little Bulk, and whitiſh like a bubble: Then a little lower, the *Oeſophagus* being placed with the Muſcles, deſcends thence with a ſtreight paſſage to the Ventricle.

It's Brain.

Oeſophagus.

Nigh

Pericardium and Heart.

Nigh to the top of the *Oesophagus*, the Heart beating is placed, having reciprocal turns of *Systole* and *Diastole* or pulses, as in more perfect Brutes: from either side of the heart, and from thence a little lower, are framed whitish Bodies, and something globous or round, and on either side distinguished as it were into Three Lobes. The Two superiour of these, shine more bright and are smaller; the lowest little Globe, greater in a double measure then either of the other, is long and like a Sawsage; between these whitish Bodies, and more backward, other lesser little Globes as they were small and little yellowish whelks, are placeed in a two-fold series, to wit, on either side, now Four, now Five, or more. Noted Blood-carrying passages go thorow the midst of these Bodies, and in them a notable pulsation, as it were in the neighbourhood of the heart, is beheld.

White Globes which are Spermatick Bodies.

By what names I should call the aforesaid parts, and for what uses they served, I was a long time in doubt, because in the dissection, or by blowing them up with a Pipe, I could find no Cavity in them; but some of the little globes being opened and squeesed, there dropt out of them a milky humour, from whence I presently suspected, that they were spermatick Bodies; which seemed likely, because these parts were not formed after the same manner in all the Earth-Worms. Further, it was sufficiently obvious, that Earth-Worms Coupling together, do not strain themselves as most of the other Brutes, by a direct planting of either Sex about the Tails, but on the contrary, by mutual embraces about the Head. At length, after I had often and narrowly inquired into the matter, it appeared past doubt: For by chance dissecting a certain bigg-bellied Worm, I found the greater white shining Bodies, and the longish like a Pudding or Sausage, stuffed with very many Eggs: Moreover on the other side of these Bodies, in the Breast of the Earth-Worm, appeared two white shining little Paps, with holes, which seemed to be the privy members of the Earth-Worm. *Malpigius* hath observed, in *some Insects, and especially in the Beetle and Imperatus's Mole, certain little whitish Globes about the Ventricle* (like as it seems to these in the Earth-Worms) *to be found, and a portion of it, to be incompassed with plenty of them*: It is very likely that these Bodies are also spermatical in them.

The like to these in other Insects.

The Ventricle, of which there are three Bellies &c.

Below these whitish shining Bodies, the Ventricle, of a noted bulk, is placed, indued with a large Cavity, and divided into three Regions or Bellys. From the lowest of these, the *Intestinum* proceeding, is carried by a streight and long passage, even to the Tail, and in the whole space is so compressed, by the several interspaces of the anulary Muscles, that it appears like the *Colon* or Arse-Gut in perfect Animals, divided as it were into very many little Cells. This *Intestine* being dissected long ways, and the dung removed, in its bottom was placed a vessel, in its whole passage, of a yellowish Colour, from the Tail even to the Ventricle; but in the same place arising up, and creeping thorow the walls of the Stomach, is stretched forth even to the Head: This Vessel is in truth a *Tube*, which being blown up by a Pipe, shew'd an ample Cavity; and that which *Malpigius* noted to be stretched forth upon the *Ventricle* and *Intestines* of Insects, seems answerable to these passages and vessels, and we may well suspect it to be in the place of the Liver and *Mesenterie*. In some Earth-Worms about the Tail, on either side of the *Intestine*, we found sometimes very many Eggs, ready to be lay'd, which indeed were seen to have descended thither, from the genital parts, and were cast out by the Passages lying open into the Arse.

The Intestine.

An Intestine in an Intestine, which is in the place of the Liver and Mesentery.

The holes in the back of the Earth-Worm, which seem to be Wind-Pipes.

So much concerning the internal parts of the Earth-Worm, opened with its Belly upwards: If the same be held down with its Belly downwards, on the top of the Back, near the brim of every Ringlet, little holes are continued; almost in the whole Passage, from the Head to the Tail; into which, if you blow with a Pipe, presently the underlying parts swell up, the dung of the *Intestine* being driven up and down here and there, backward and forward: From these holes, if they are pressed, a white, viscous, and sometimes a milky Humour drops forth, which seems to be muck or stuff besmearing those Cavities, and fortifying them against the inclemency of the Air.

Without doubt these little holes are so many Wind-Pipes, which as in bloodless Insects, being numerous and dispersed thorow the whole Body, supply the place of Lungs, and draw in the nitrous Air for the inspiring the Vital Liquor, and by and by sends it forth being spent. But against this it may be objected, That little and sometimes almost no respiration serves the Earth-Worms. Becaufe they sometimes lye hid in the depth of the Earth, for above three Months, and are able so to ly and to live; yea, if the holes of the Wind-Pipes be smeared over with Oyl, they do not presently dy like the bloodless Insects; but being immersed in Oyl they swim in it unhurt, and live a long while; but if you apply heat to them, tho moderate, they dy presently: The same thing we have observed almost of Fishes, and especially of the Shelly and Crusty, who bear the defect of Air or Water, better than the presence of Fire, or Heat.

The

The reaſon of this (that we may defend our *Hypotheſis*) we ſhall indeavour to ſhew; we have ſhewn in a late Tract, That altho Fire and Flame neceſſarily require, beſides Sulphureous food from the matter of the Subject, ſomething nitrous from the Air, which being denyed or withdrawn, they are ſuddenly extinguiſhed; yet, if that the matter be inkindled of Sulphur and Nitre (as is wont to be in Gun-Powder) together mixed with the Concrete, that Fire or Flame will burn in the midſt of the Waters, or in a place Empty of Air; to wit, becauſe either food being contained within, they do not preſently deſire ſupplyes from without. In like manner we ſuppoſe it may be concerning the *Hypoſtaſes* and accenſions of Brutal Souls: For altho many of theſe being inkindled in their vital humour, draw in altogether from the ambient Air, a Nitrous, and from within a Sulphureous Food; Yet in the blood of ſome of them, which are deſtinated to the Waters or to the Earth, much of Sulphur thick and Earthy, with little of Nitre, and very little only of ſpirit and volatile Salt, may be ſo temper'd that it being inkindled into Life, may burn with a ſilent and almoſt ſuppreſſed fire; neither requires from without the acceſs, either of much or continued nitrous Food, but, as it hath a certain inteſtine task, its burning is more ſecurely performed in the Earth or Waters, than in the open Air: For that indeed from this, there is danger of too much inkindling the ſulphureous Particles, and ſo quickly of overturning the *Craſis* or diſpoſition of the Soul: Wherefore, theſe kind of Animals greatly abhor fire or external heat, which may make the internal Sulphur to work, and too much to burn. However, altho the Souls of theſe are not contented with fire, and it ſometimes as it were hid in the Aſhes, ſuffers them to be mummed or ſtiff; yet notwithſtanding, Organs of Reſpiration are given to them all, for the continuing it aslong as it pleaſes, and as occaſion ſerves for the increaſing or repreſſing it. And indeed the Creatures of a more frigid blood, appear to be conſtituted or imbued with plenty of Sulphur, tho ſparingly inkindled, becauſe Earth-Worms and Fiſhes, quickly putrifying, yield a moſt ſtinking ſmell; and the putrified fleſh of ſome of theſe, by reaſon of the very many Effluvia's of Sulphur, ſhine in the dark like a live Coal. Moreover, it hence appears, that the ſaline Particles, which make up the temperament of theſe, are for the moſt part nitrous, and beſtowed for the food of Life; becauſe from the bodies of theſe, diſſolved by Chymical operation, you can neither draw a Volatile Salt, as out of all Other Animals, nor a Fixed. The Images of the Earth-Worms, ſhewing their Anatomy, are deſcribed in the Fourth Table.

Earth-Worms and Fiſhes, abound in nitrous Salt, being almoſt wholy deſtitute of a fixed and Volatile Salt.

In the next degree of the more frigid bloody Creatures, above Earth-Worms, Fiſhes are placed, indued with one belly'd Heart and Gills. If indeed Lungs be wanting to theſe, the other boſom of the Heart were ſuperfluous. But moſt Fiſhes want Lungs, both for as much as living in the Waters (whoſe medium is not fit for ſounds) they have neither voyce, nor make a noyſe, and chiefly, becauſe the water ought not to be emitted thorow the Wind-pipe, into all the Cavities of the Lungs, if they had them; for that by watering them, or overflowing them, it would preſently overthrow them, and fill them to a ſtiffneſs: But as in Brutes with Lungs, the Air being admitted within it, ſlides thorow all the blood-carrying Paſſages every where; that entring the little mouths of the Veſſels, every where gaping, it inſpires the Blood with nitrous food; ſo the Gills in Fiſhes, which are ſubſtituted as ſo many Lungs, or rather inverted, are ſo placed without the Cavity of the *Thorax*, that the Waters continually flowing to the Paſſages of the Veſſels, and their little Mouths being outwardly planted, whilſt the Gills are inlarged, they inſpire ſomething nitrous, or what is like it, to them; the remains of which, being by and by ſpent, the Gills being contracted, is ſent away again; and ſo by Continued reciprocations of Inſpiration and Expiration as in hot Animals, the Life or the Flame of the Blood is Conſerved.

In the next degree of the more frigid bloody Creatures are Fiſhes.

They are indued with an one Bellyed Heart and Gills.

We have not much to ſay concerning the ſtructure of the Gills, they being already ſufficiently deſcrib'd by ſeveral: As to their fabrick, they are bony ſemi-circles, planted on both ſides of the bottom of the Mouth, nigh to the opening of the Gill holes, which are made hollow quite thorow, with little ditches, as it were quilly, that they may receive the Veſſels ſent to them and much branched forth, and defend them againſt injuries.

The Structure and uſe of the Gills.

The Veſſels belonging to the Gills, are Arteries, and Veins; which in the Sturgion, Salmon, and Cod, are found to be made after this manner: The *Aorta* going forth of the Heart, and aſcending towards the Chin, or end of the lower Jaw, ſends forth branches to the right and the left; ſome of theſe preſently growing forked, accommodate an Artery to two Gills of the ſame ſide, which by and by being again divided, puts thorow two arterous ſhoots, thorow the Bow of every Gill, near to the bony Baſis; then from them, others ſmaller thick ſet ſhoots, tend into the ſides and midſt of every Come-like Finn: After the Gills being paſſed thorow, all the arterous Branches meet together again, and Conſtitute the ſame Trunk, which being by and by reflected, has a

proſpect

proſpect to all the other parts. The Trunk of the *Vena Cava* or hollow Vein deſcending, applyes it ſelf and enters near into the *Aorta* aſcending into the Gills. Further, in the ſeveral Finns of the Gills, leſſer ſhoots, as in the Bows, anſwer the greater paſſages of the Venous, with ſo many Arterous ſhoots. Beſides, from the ſeveral parts on both ſides the Gills, a veinous branch is inſerted into the deſcending Trunk. This plainly appears, becauſe if you open the branches both veinous and arterous, lying on the Bows of the Gills, there will appear a ſeries or row of holes leading into the Finns; Moreover, a black Liquor being caſt into thoſe Arteries, will return by the Veins. Yet I have obſerved, part only of that injected Liquor to turn aſide thorow the holes into the Finns, but another part to paſs directly thorow into the Channels, and thence to flow into the deſcending Trunk of the *Aorta*, which the Gilly Branches being at length all united do frame: From hence I gather, That the Blood in Fiſhes, (not as in Brutes with Lungs) is carried at every Circuit, or paſſes thorow the Veſſels, between the organs of reſpiration, not all, or whole, or is carried from the Arteries into the Veins, whereby the hole might be inſpired anew of the Air; but for that they, as we have ſhewn, enjoy in themſelves a nitrous food partly inteſtine, therefore it ſuffices them, that the blood only be by parts expoſed to the External Nitre flowing to it.

Not all the Blood, but a part only, is carryed thorow between the Gills, at every Circulation.

Fiſhes breath by the Gills.

From theſe alſo it ſeems to appear, That Fiſhes do breath by the Gills, or draw what is nitrous from the Waters, and do enjoy it as it were the neceſſary food of Life; which alſo many other Reaſons do manifeſtly declare: To wit, for that the Waters where Fiſhes dwell, ſtanding ſtill a long time, tend to putrefaction; or if by too much Heat or Cold, or other means, by which the nitrous Particles are wont to be driven away or perverted, they be affected, they Choak their Inhabitants. Further, if Fiſhes be ſhut up in little water, or with too ſtrait limits, alſo if more than ſhould be in the ſame Fiſh-Pond, tho large enough, tho they have plenty of food, they will dye for want of the nitrous food, which alſo argues the Cauſe of their death, for before they dye, they will ſhoot forth of the waters, putting forth their mouths and heads, to take in the naked Air: ſo that it may from hence be Concluded, That there are alſo in theſe Inhabitants of the waters firie Souls; to wit, the *Hypoſtaſes* of which are an heap of moſt ſubtil Atoms, which being ſtirred up into motion, by a certain inkindling, do require, for the Continuing of their ſubſtance, beſides the Sulphureous Aliment within, which they feed on, another nitrous from the ambient Medium.

wherefore Fiſhes rejoyce rather in the Waters, than in the Air.

But that Fiſhes rejoyce in the region of the Water inſtead of the Air, where any one would think that their Flame ſhould be rather extinguiſhed, than inkindled, we gave the reaſon of it but now, to wit, as certain Animals are deſtinated to theſe places, their Souls were ſo temper'd, that as the matter made up of Sulphur and Nitre mixt together, they burn or grow hot under the waters, yea they there live more ſecurely; to wit, for as much as there is in them plenty of Sulphur, it is ſuffer'd to be only ſparingly inkindled, and to burn forth. Further, altho ſome nitrous Particles ſeem to enter into the intrinſick and ordinary food of the vital fire, and leſt the flame, by the defect of theſe, ſhould expire, new ſuppliments are daily inſtilled through the Gills: yet indeed, by reaſon of the divers Conſtitutions of Souls, living Creatures do reſpire after a ſeveral manner, and ſome require this medium more thick, others moderate, and others more thin. And for this Cauſe, ſome living Creatures, whilſt they remain in the ſame number, ſometimes change their ſphere or ambient medium, and ſometimes go out of the Waters into the Air, and ſometimes from this into them. A certain Inſect called the watry *Phryganion*, in ſome places in *England* a *Caddis*, at the firſt of the Spring is cloathed with a Coat of a ſprig or ſmall rind of wood, and creeps into the depth of the Rivers, in the ſhape of a Mite or rather a Maggot; afterwards, when its Soul begins to be ſublimed, he gets to the tops of the Bulruſhes, and in the Month of *May*, riſing up to the ſuperficies of the water, puts off its Coat, and having wings, flyes into the Air, and there lives during Life. Who knows not that Frogs live at firſt in the Waters, in the ſhape of a Tadpole, altogether; then all the Summer do leap about in the Meadows, and that at laſt in the Autumn, returning to the Waters, do bury themſelves in the Mud? After this manner, many more Inſects, do not only change the Region, but alſo vary their Species or Kind, and of Reptils become flying Creatures.

Certain Animals change the Regions of the Air and Water.

Brutes of a more cold blood, which are framed with a Heart with a two-fold Belly, and with Lungs.

Thirdly, A little more ſuperior degree of Creatures of a more frigid or cold blood, is thoſe who are gifted with a doubl'd belly'd Heart, and with Lungs; of which ſort are Serpents, Liſards, and ſome Amphibious Creatures, that is ſuch as live on Water and Land, as the Frogs, and ſome Fiſhes, to wit, the *Polypus*, the *Sea-Calf*, with many others. To theſe former, Lungs are neceſſary, becauſe they oftentimes live in the open Air, which always ought to be deeply admitted into the *Præcordia* themſelves; Moreover, becauſe they put forth a certain ſound, for which a Wind-pipe is required; but

for

for as much as Lungs are granted to them, ſo alſo a two-fold belly'd Heart, without which the blood paſſes not thorow the Lungs. As to what reſpects the *Amphibious* Creatures, which at their pleaſure now live on the Land, and now in the Waters, tho it appears that theſe cannot ſtay always, or very long under the water, yet it is to be wonder'd at, how in the mean time they breath; for if they open the Wind-Pipe, the Waters ruſhing preſently in, would drown the Lungs. *Bartholinus* eaſily untyes this doubt, by aſſerting, That in theſe Brutes, an Oval hole as in *Embrio*'s, is kept open all their life-time. *Cornelius Conſentinus* affirms it after the ſame manner to be in Divers, or ſuch as dive under the waters; and he ſhews the manner whereby ſome men may be made able to dive; to wit, if whilſt they are Infants, they be provoked often to Cry, they are ſuffered a long time to reſtrain the ſpirit, from hence there will be a neceſſity of caſting forth the Blood thorow the oval hole or navil, and for that reaſon will hinder its Coalition or Cloſing up.

But indeed in theſe Brutes, as to ſuch a Conformation of the *Præcordia*, the moſt skilful Anatomiſt Doctor *Walter Needham* did doubt, and deſired to have found it in ſome of them by an ocular ſearch, after many diſſections.

On which the faculty of diving depends.

However it is, we are to ſuppoſe theſe living Creatures do not breath, whilſt they are under the Waters; and from thence the Courſe of their Blood is by and by made more ſlow, and ſmaller: In which Condition it matters little, whether it ſo growing torpid or ſluggiſh, creeps from the hollow vein into the *Aorta*, by the navil hole; or whether lying quiet, it creeps forward by a gentle or ſlow pulſe of the Heart; for either way, there will be a neceſſity, that the Vital fire, for defect of aerial food, would be preſently diminiſhed, and as it were depreſſed into a halituous or breathy ſubſtance: Notwithſtanding in the mean time, that it may not wholly Expire or be Extinguiſhed, theſe two things are done, *viz.*

Firſt, Becauſe in theſe Animals (and as in all Fiſhes) the Vital fire, together with a certain Sulphureous and alſo Nitrous food within (as we have ſhewed) is injoy'd; therefore it is able a long time to want its external ſupplement from the Air.

Then Secondly, in ſome of them the *Hypoſtaſis* it ſelf, or Conſtitution of the Soul, conſiſting of leſs ſubtle Particles, is not ſo ſuddenly diſſolved; but that its parts ſtick together more ſtrictly among themſelves: nor are they wont to be diſſipated preſently, by any force, as in more hot Animals. Further, as their Souls, as to the greater part by much, ſubſiſt in the Brain and Nervous ſtock, more than in the Blood, it comes to paſs, that however this fire being diminiſhed and almoſt ſuppreſſed, the Animal faculties remain ſtill lively enough: and indeed, far otherways than in hot Living Creatures, whoſe blood being obſtructed about the *Præcordia*, preſently there follows an Ecclipſe of the Animal faculties. Notwithſtanding, Frogs, Eeles, and Serpents, after their Hearts are taken forth, will live for ſome time, and leap about; yea, by reaſon of the animal ſpirits being intangled with a viſcous matter, and not eaſily diſſipable, retain for a little while motion and ſenſe, after their Bodies are cut in pieces, and the ſeveral portions divided, and lay'd apart; as we have ſhew'd before.

In the higheſt form of Animals are thoſe of an hot Blood.

The Third and higheſt Form of Animals, Is that of Creatures of an hot Blood, all which are framed with a two-Belly'd Heart, and Lungs. The Anatomy of theſe being already ſo accurately performed by many, and commonly known, there needs not any deſcription of the Hiſtory and Uſes of the Vital or Animal parts, in theſe kind of Creatures or Brutes.

They are furniſhed with a two-fold belly'd Heart and Lungs.

The chief Species of this Kind, are Fowls and Four-footed Beaſts, and in the ſame Claſs or Rank, we place with the Souls of the later, alſo the Inferior or Corporeal Soul of Man; and that rightly, becauſe there is the ſame Conformity in either of their *Præcordia*, of their Brain, and alſo of their nervous Appendixes; which notwithſtanding differs from that of Fowls or Birds. What kind of difference this is, between thoſe and theſe, as to their Animal parts, we have formerly declared at large; and now we ſhall notifie what difference happens between them, as to their Vital parts.

How the Lungs differ in Birds and four footed Beaſts.

The Lungs of Men and Four-footed Beaſts are every where ſhut in the outmoſt ſuperficies, that the Air entring by the *Trachea* or Wind-Pipe, and by and by entring into its Chanels, quickly blows up all the Lobes of the Lungs, and diſtends them, but it goes no further: But in Fowls, the Lungs being full of holes, admit the inbreathed Air into the whole Cavity of the Belly, which by the Muſcles of the *Abdomen* or lower part of the Belly, is exploded thence. The reaſon of this I ſuppoſe to be in ſome part, that there may be a greater plenty for ſinging, and (in ſome) for the longer tuning of the Voyce, or for the more ſtrong or longer breathing forth of the Air. Beſides, (for that all are not ſinging Birds) it is ſo provided for, in theſe Brutes, that by reaſon of the Trunk of the Body being filled, and as it were extended with Air, they may the more eaſily fly, and are more eaſily held up, by the outward Air, by reaſon of that within.

For what end the Lungs are perforated in Birds.

Indeed Fiſhes, that they may the more lightly ſwim in the Waters, have in their Bellyes Bladders blown up with Air. In like manner Fowls, by reaſon of the Trunk of their Body, being full and as it were blown up with Air, whilſt they rely on the open Air, become leſs heavy, and ſo fly more lightly and faſter. Hence it comes to paſs, that men being in danger of drowning, whilſt they ſwim, receive great help by reſtraining the ſpirit, and inflating the Breaſt as much as may be: yea Dead Carcaſſes being drowned, after the breath or fumes begotten by the inward putrefaction, and ſhut up within, blow up the fallen Cavities of the Viſcera, and extend them more, riſe up again, and ſwim on the ſurface of the Water.

That the Souls of the more hot Brutes is chiefly Fire.

If we inquire into the Souls of the more hot Brutes, without doubt, it was at firſt in reſpect of theſe, that the Ancients did declare the Soul to be Fire, and the more modern Fire or Flame, theſe placing it in the Heart, thoſe making it to be inkindled in the Blood: And indeed, ſince we have granted Souls, as it were fiery, to Bloodleſs Creatures, and thoſe of a more cold Blood (which alſo the Lord *Bacon* grants to Plants) it is not for us to deny the ſame dignity, in Creatures of a more hot Blood: For beſides, that the Souls of thoſe, like Flame, require abſolutely either ſort of Food; *viz.* the Sulphureous and the Nitrous, and cannot be a minute without them, the very hot Blood alſo, is ſeen, by mere accenſion (for as much as we cannot ſhew how it can become ſo hot after any other way) to boyl up, yea and the Lungs, hanging to the two-bellyed Heart, to be the fire-place, chimny, or breathing hole, of the Flame cheriſhed within them. Therefore, as the Soul of the Brute of a more hot Blood, being the perfecteſt in its Kind, is as it were a Rule or Square, by which others more inferior ought to be meaſured, and as the ſame actuating and vivifying the humane body, is ſubordinate to the Animal, and is the immediate ſubſtance of it, (as ſhall be more fully ſhown) it remains now, that we inquire into its Nature and Eſſence, and firſt of all, that we ſearch into, what parts, powers, and affections ſhe has, which ſhall be the chief Members of our Pſycheology or Diſcourſe of the Soul.

In Man the Corporeal or fiery Soul is ſubordinate to the Rational.

The parts of the Corporeal Soul.

The Explanation of the Figures.

The Firſt Table,

Contains certain Figures taken out of *Malpigius*, in which the Vital Organs of the Silk-Worm and of other Inſects are repreſented.

The Firſt Figure

Shews the Navil-hole, of which two being planted in the ſides of every Section or little Ring (except in the three uppermoſt) are the Doors or Openings of the Wind-Pipes.

A. A. *The Extremity of the hole, which being black and a little reflected, is united to the Contained Head of the Wind-Pipe.*

B. B. *The Head of the Wind-pipe, filling the Hole, in whoſe middle is a Cleft.* C. *To which little fibres, like an hairy ſpace, being brought, draw together the gap, or dilate it, that the Air may go out and in at its pleaſure.*

The Second Figure

Shews ſome interior Branchings in the Silk-Worm.

A. A. *A gaping, where the head of the Wind-pipe opens into the oval hole or Navil.*

B. B. B. C. C. C. *The foldings or ramifications of the Wind-pipe, diſtributed into the Viſcera and other neighbouring parts.*

D. D. *Greater Branches, reaching from the lower and upper head of the* Trachea *or Wind-pipe, towards the other infoldings.*

The Third Figure

Shews the Ramifications of the *Trachea* or Wind-Pipe in a Graſhopper.

A. *The head of the Wind-Pipe opening outwardly into the Hole, by and by is branched forth inwardly into various ſhoots.*

B. *The*

page. 18. *Figura. I^a*

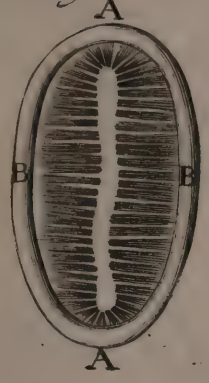


Figura. II^da

Tabula I^a

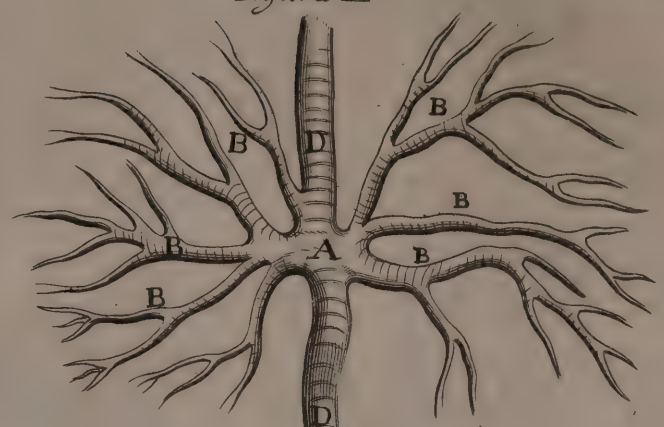
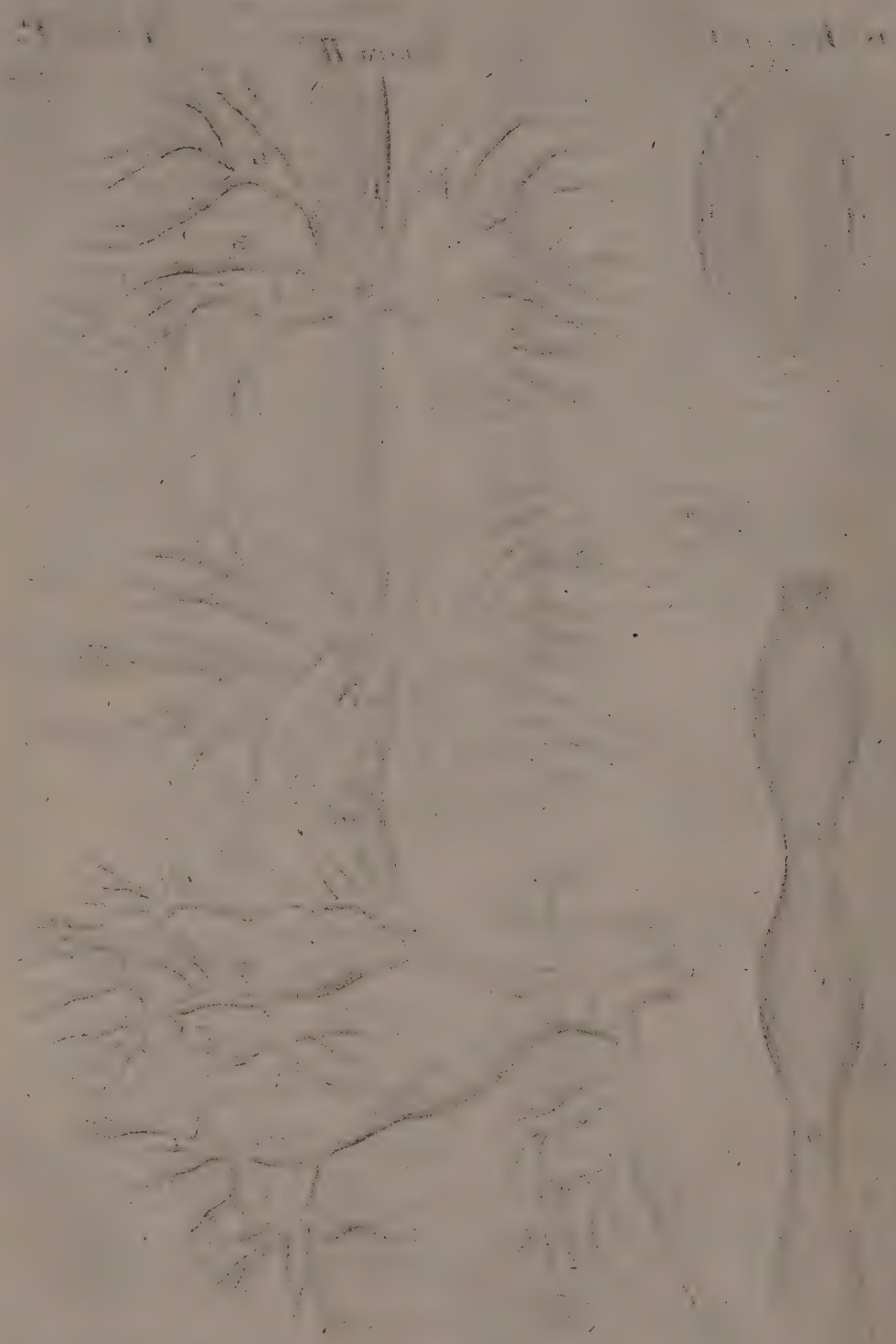


Figura. IIII.^ta

Figura. III.^tia



Tabula II.da

Figura I.a

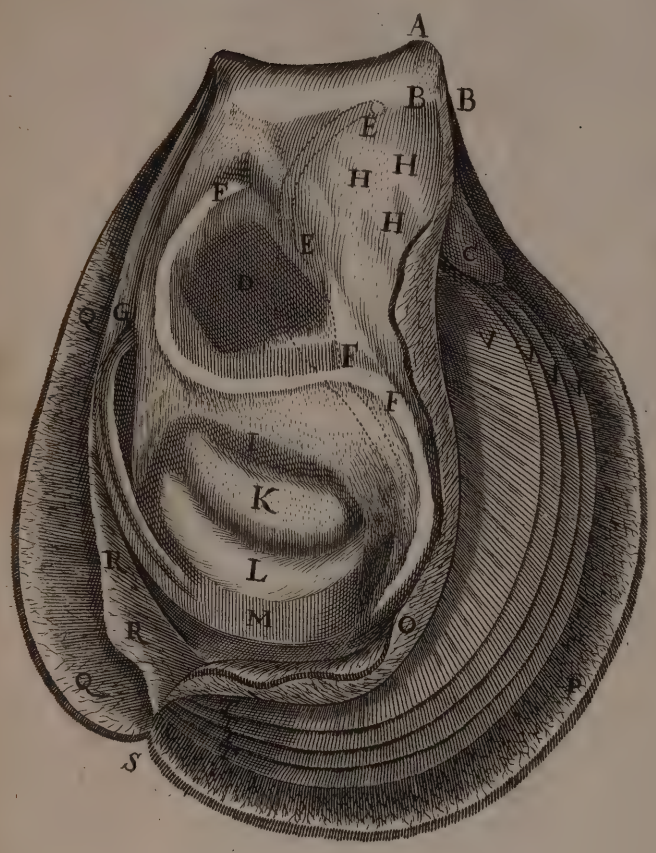
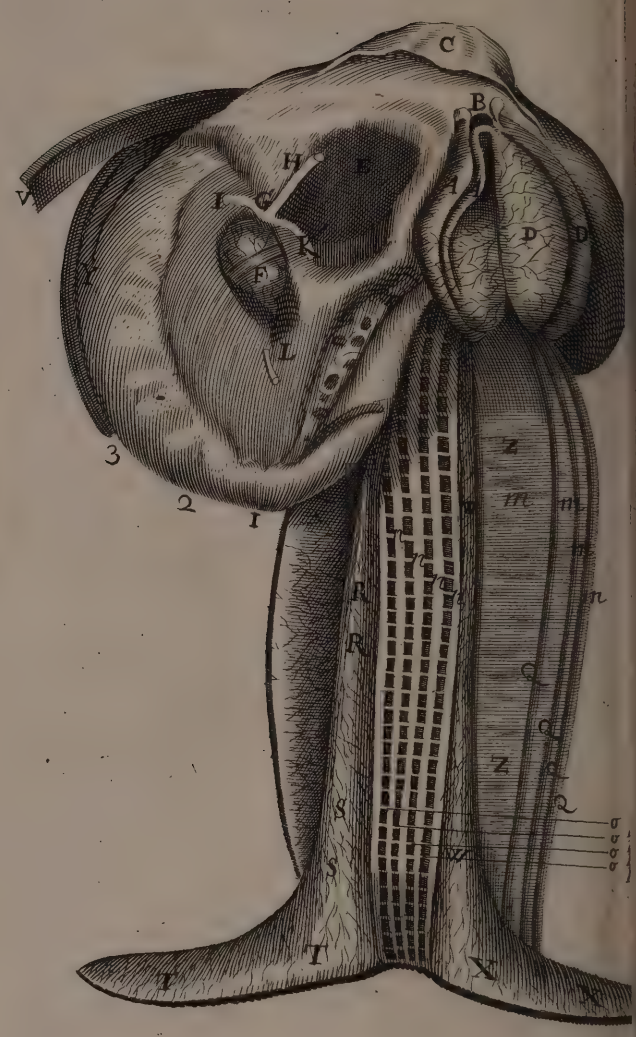


Figura II.da



B. *The greater ſhoots of the Wind-pipe, being extended by degrees into the Ovals, as it were into bladders.*
C. C. *The leſſer ſhoots going from thoſe greater.*

The Fourth Figure,

Expreſſes the Heart of the Silk-Worm, which ſeems to be made oblong and unequal, as if into many little oval Hearts.

A. *The upper part of it nigh the Head.*
B. *The lower part nigh the Tail.*
C. C. *The broader part of the Heart.*
D. D. *Its narrow portions.*

The Second Table,

Of which

The Firſt Figure

Shews the Oyſter taken forth and whole from the ſhell, that his parts may be ſeen as they are in their natural ſituation.

A. *The Head of the Oyſter, in the Corners of which,*
B. B. *The Circular Muſcles, going about the whole Body are terminated.*
C. *The gaping or Chink leading between the Muſcles and Gills to the Mouth.*
D. *The ſuperior portion of the Liver, of a browniſh colour, leaning to the Ventricle.*
E. E. *The* Oeſophagus *leading from the Mouth to the Ventricle.*
F. F. F. F. *The* Inteſtine, *deſcending from the Ventricle towards the Corner of the ſtrait muſcle, which being from thence bent inward and rolled about, aſcends above the Liver, being there hidden, ariſes again in* G : *and is terminated in the Arſe.*
H. H. H. *The skin with the glandulous fleſh and fat hiding and lying between the Viſcera.*
I. *The Cavity in which are the* Pericardium, *Heart and Veſſels.*
K. *The ſtrait Muſcle, with the perpendicular fibres, opening the ſhells.*
L. *The other ſtrait Muſcle, the Tendons of which growing to either ſhell ſhut them.*
M. *The thickneſs of the ſame Muſcle, and the altitude of the fibres, are denoted.*
N. N. *The Circular Muſcles including the Gills from the right ſide.*
O. *The ſuperior Circular Muſcle leaning to the Gills, being rolled out of its ſight, that the Gills may be beheld.*
P. *The inferior Circular Muſcle lying under the Gills.*
Q. Q. R. R. *The Parts of the ſame Muſcles placed on the left ſide of the Oyſter.*
S. *The Boſome, where both the Circulary Muſcles, and their right and left parts coming together, Conſtitute the Paſſage, for the admitting the waters to the Gills, and for the ſhutting them forth from thence.*
T. T. T. T. *Four inferior Tufts of Gills which are thinner and broader.*
V. V. V. V. *Their ſuperior Tufts thicker and more contracted.*

The Second Figure

Repreſents the Oyſter open, and unrolled, that its Viſcera and internal parts may be ſeen.

A. A. *Two Gills diſſected from the uppermoſt, and removed out of their places, that the Mouth of the Oyſter may be plainly ſeen.*
B. *The Mouth of the Oyſter.*
C. *The Veil or Covering of the Mouth.*
D. D. *Two other ſuperior Gills in their proper ſite with the Creeping Veſſels.*
E. *The ſuperior browniſh portion of the Liver under which the Ventricle lies hid.*
F. *The Heart made bare from the* Pericardium *with the broad and blackiſh Ear of it.*
G. *The* Aorta, *by and by from the going forth of it from the Heart, divided into three branches.*
H. *The firſt Branch aſcending towards the Head.*
I. *The ſecond towards the ſtrait Muſcles.*

K. *The third Branch tending into the Gills.*
L. *The Trunk of the hollow Vein, entring into the little ear of the Heart.*
M. M. M. M. *The Inferior Gills, with the Circular Muſcles, cut off from the Body of the Oyſter, where they ſtuck to it, and ſpread forth, that their Paſſages and Cævities might be beheld.*
N.N.N.N. *The yoakings or beginnings of the Gills on which lye the ſeveral Veſſels, viz. Veins and Arteries,* O.O.O.O. *and the holes lying between,* P.P.P.P.
Q.Q.Q.Q. *The Extremities or fringes of the ſame Gills.*
R. R. *The Inferior Circular Muſcle of the right ſide, out of its ſite and inverted, that it may be ſeen.*
S. S. *A portion of the ſame by which it ſticks to the bottom of the Oyſter.*
T. T. *A portion of the ſame which Compaſſing the left ſide of the Oyſter, ſticks to the portion* V.
W.W. *The upper Circular Muſcle of the right ſide, folded and contracted, that it may not hide the Gills.*
X. X. *A Portion of the ſame which Compaſſing about the left ſide of the Oyſter, ſticks to the Portion* Y.
Z. Z. *The ſuperficies of the Gills, in which the Finns or ſtreaked Paſſages, for the ingreſs and egreſs of the Vital humour and the waters, appear.*
1. *The lower border of the Oyſter, from which the Yoakings and the Circular Muſcles are cut off.*
2. *A Portion of the Inteſtine ending in the Arſe.*
3. *The Arſe.*

The Third Table.

The Firſt Figure

Shews the Lobſter open in the back, that the Brain, Viſcera, Vital, Genital, and other interior Parts may be ſeen.

A. A. *The Brain double, the Hemiſpheres of which being diſtinct, are ſeparated one from the other, alſo a little from the oblong Marrow.*
B. *The Head of the oblong marrow, out of which the optick Nerves* b. b. *and the Mammillarie Proceſſes under them, proceeds.*
C. *The Cerebell.*
D. D. *Two ſhanks of the Oblong Marrow, which paſs into the Spinal, and as it were two greater Nerves, meet now and then in their deſcent, and now and then ſeparate, and then again come together.*
E. *The* Carotis Arterie.
F. F. *A portion of the* Oeſophagus.
G. *The Opening of the Ventricle.*
H. *The upper Orifice.*
I. *The Bottom and Lower Orifice near which are three Teeth.*
K. *The Temporal Muſcles out of their place.*
L. L. *Muſcles appendixes of the former.*
M. M. *Bodies ſtuffed with pipes and Glandula's or little Kernels, into which paſſages lye open, from the Ventricle, to whoſe Sides they grow; theſe ſeem to be in the place of the Liver and Meſenterie.*
m. m. m. m. *The ſame Bodies brought lower from either ſide, and ending in the proceſſes,* m. m.
n. n. *Spermatick Bodies ariſing on both ſides of the Ventricle, which deſcending under the* Pericardium, *are terminated in the proceſſes,* n. n.
o. o. *Proceſſes out of the Spermatick Bodies, like to the* Epididymis, *from which are two Yards.*
p p. *Two Yards, in the tops of which, thorow the holes made in the laſt little feet but one, a paſſage lyes open.*
q. *The hole in the little Foot for the going forth of the Yards.*
R. *The* Pericardium, *with the Heart included.*
S. *The little Ear of the Heart into which the* Vena Cava *enters.*
T. T. *The aſcending Trunk of the* Vena Cava.
V. *The* Aorta *going out of the Heart, cleft into three branches.*
W. *The firſt Branch to its Head.*
X. X. *Two other Branches in either Side ſent thence to the Gills.*

Y. Y. *The*

Figura I^ma

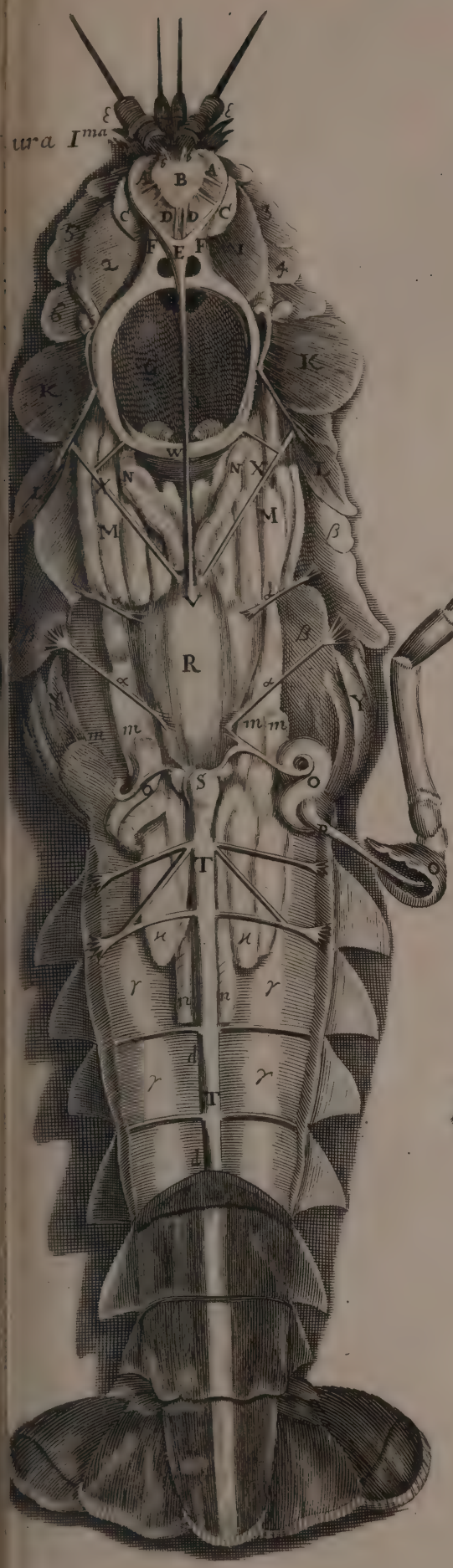


Figura II^da

Fig III^tia

Tab IIII

Figura I^ma

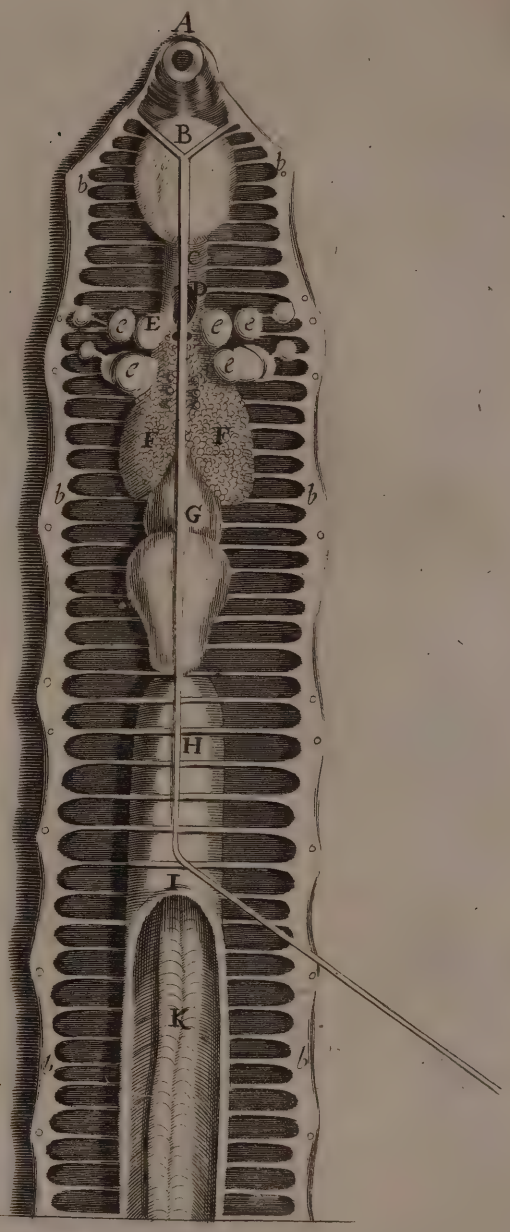
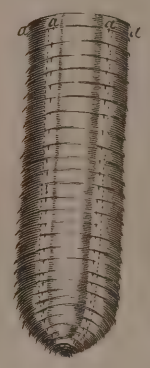


Figura III^tia

pag. 21

Figura II^da



Y. Y. *The Tops of ſome of the Gills in view.*
1.2.3.4.5.6. *Some portions of the Muſcles.*
α. α. α. α. *Ligaments from the* Pericardium *to the Muſcles of the Breaſt.*
β. β. β. β. *The Muſcles of the Belly, and Breaſt.*
γ. γ. γ. γ. *Muſcles belonging to the Tail.*
δ. δ. *The Inteſtine from the Ventricle to the Arſe.*
ε. ε. Tubes *or Pipes, within which, the Optick Nerves are brought to the Eyes.*

The Second Figure

Shews the Womb of the Lobſter, and its Neck, and Privy Member, or aperture made thorow the hole in the laſt little Foot but one, together with the little Foot it ſelf, and the affixed Gills.

A. *A portion of the Womb or place of Eggs, full of Eggs.*
B. *The neck of the Womb.*
C. *Its Orifice in the hole of the little Foot.*
D. *The Baſis of the little Foot.*
E. *The little Foot, the ſhaking of which moves the Gills fixed to it.*
F. F. *Two Gills fixed to the baſis of the little Foot, with Finns or ſpongy borders.*
G. *The appendix of the Gills, which like a bladder or membranous bagg, may be blown up and diſtended.*

The Third Figure

Expreſſes a portion of the Gill cut off, that its three Paſſages or Cavities may appear.

The Fourth Table.

The Firſt Figure

Shews an Earth-Worm laid with its belly upwards, the greateſt part of it diſſected and lay'd open, that the Brain, *Præcordia*, *Viſcera*, and other Parts may be ſeen.

A. *The Mouth and Chin of the Worm.*
B. *The Brain, in the ſuperficies of which, an Artery Expanſed or ſtretched out, deſcends to the Heart, and from thence to the Tail.*
b.b.b.b. *Annulary or ringie Muſcles opened and unfolded with their Tendons.*
C. *A portion of the* Oeſophagus.
D. *The Heart.*
E. e.e.e.e. *The upper little white ſhining Globes, both the greater and the leſſer.*
F. F. *Two lower Globes, bigg and full with Eggs.*
G. *The Stomach, of which there are three Bellies,* 1. 2. 3.
H. *The Inteſtine, deſcending from the Ventricle, which being bound by the Tendons of the ringie Muſcles, appears like the Gut* Colon *in perfect Animals.*
I. *A portion of the ſame Inteſtine opened, that the Body included in it, or the Inteſtine in the Inteſtine may be ſeen.*
K. *That interior Body, which ſeems to be in the place of the Liver, and Meſenterie.*

The Second Figure

Expreſſes a portion of the ſame Earth-Worm, with the Tail cut off, that the rowes of little Feet, which are 4, to wit, *a. a. a. a.* may be ſeen.

The Third Figure

Shews the whole Earth-Worm prone, or with its back uppermoſt, that the ringie Muſcles, and the Wind-Pipes in them, may be ſeen.

CHAP.

CHAP. IV.

Of the Parts or Members of the Soul of the Brutes.

A double Subject of the brutal Soul.

THE Corporeal Soul in more perfect Brutes, and common to Man, is extended to the whole organical Body, and vivifies, actuates and irradiates both its ſeveral parts and humours, ſo it ſeems to ſubſiſt in both of them eminently, and to have as it were its imperial ſeats; But the immediate ſubject of the Soul, are the Vital Liquor or the Blood, Circulated by a perpetual Circulation in the Heart, Arteries, and Veins; and the Animal Liquor or Nervous Juyce, flowing gently within the Brain and its Appendixes: The Soul inhabits and graces with its preſence both theſe Provinces; but as it cannot be wholly together at once in both, it actuates them both, as it were divided, and by its parts: For as one part living within its Blood, is of a certain fiery nature (as we have ſhown) being inkindled like flame, and the other being diffuſed thorow the animal Liquor, ſeems as it were Light, or the rayes of Light, flowing from that Flame; which from thence being Excerpted, and manifold ways reflected and refracted, by the Brain, and Nerves, as it were by Dioptrick Glaſſes, are diverſly figured, for the Exerciſes of the Animal Faculties.

The blood or vital Liquor.

The Nervous juyce or animal Liquor.

From hence two parts of the Soul.

Flamy and light.

There are therefore Corporeal Souls, according to its two chief functions in the Organical Body, *viz.* the Vital and Animal; two diſtinct parts, to wit, flamie and lucid, for what belongs to the ſaid natural function, that indeed is involuntary of the Animal, and is performed by the help of the Animal ſpirits.

To which may be added another the Epiphyſis or dependence of the whole Soul, viz. the Genital part.

But beſides theſe two members of the Soul, fitted to the individual Body, a Certain other portion of it, taken from both, and as it were the Epitomy of the whole Soul, is placed apart, for the Conſervation of its Species: This as it were an Appendix of the vital flame, growing up in the Blood, is for the moſt part Lucid or Light, and Conſiſts of Animal Spirits: to wit, which being Collected into a certain band, and having got an appropriate humour, *viz.* the genital, are hidden within the ſpermatick Bodies; to the end indeed, that, when opportunity ſhall ſerve, that Band of ſpirits, as it were a little Brand not yet inkindled, may be able from thence to be drawn into fit fire, and to be inkindled into another Vital Flame, the formatrix of a new animated Body.

The parts or Members of the Soul.

Concerning theſe three Members of the Corporeal Soul, two, to wit, the Vital and Animal, fiery by Act, and the other, *viz.* the Genital, lay'd up for a future firing, it ſhould have been particularly and fully here treated on: But ſince we have already ſufficiently diſcourſed of the two former, I ſhall only add briefly, by way of Suppliment, the Summ of what I have ſaid before, and then we ſhall alſo briefly diſcourſe of the begetting part of this Soul.

The Flamy part of the Soul in the Blood.

Firſt, It appears, that the part of the Corporeal Soul rooted in the Blood, is truly flamy, as to which we need only to refer you, to what we have wrote lately in a particular Tract of the Accenſion of the Blood: For there having ſhown, the heat of the Blood to be neceſſarily required, to wit, whereby a greater plenty of ſpirits may be inſtilled into the Brain, from its frame being very much looſned; by and by we prove, from thoſe three ways, by which all Liquors whatſoever are only made hot, none can agree with the blood, beſides accenſion or inkindling: For neither by heat put to it, nor by reaſon of Salts and Sulphurs, which are Corroſives of a divers Kind being put together, can the blood be made to boyl; wherefore it follows, that it is inkindled like the ſpirit of Wine, and ſo as it were flames forth and boyls up. Further we ſhewed, that it is truly inkindled in hot living Creatures, becauſe the proper Paſſions of Fire and Flame, are found only beſides in the Life of the Blood; for in like manner both to this, and to them, there is need conſtantly of an Internal Sulphureous Food, together with the External nitrous; yea, and either Flame, alike, to wit, the Kitchin and Vital, whil'ſt they burn deſire Eventilation. To theſe may be added, that the Life and Flame of the Blood, as to their Various ways of production and extinction, there particularly deſcribed and rehearſed, are wholly after the ſame manner. Laſtly, the analogie or agreement of either Flame, being ſufficiently unfolded, we have declared, by what beginnings, the Vital Flame ariſes, by what degrees it increaſes, and, after its hight, is diminiſhed; Further, we have ſhew'n reaſons, wherefore this is not viſible and deſtructive as the common Flame, but as it is Subordinate to the Corporeal Soul, as to a Superiour Form, it admitting a proper Species, and ſerving to the uſes of Nature, deſtinated by the Creator, ſilently burns with a gentle and friendly heat, like a Fire ſhut up in *Balneo Mariæ*, apart by it ſelf; and as it ſo deſtroys not the Blood, but inkindling the Liquor

Which we have ſhewed to be truly inkindled.

even

even ſo its Superficies, wholly diſſolves the frame of the whole mixture; it follows thence, that ſome particles being burnt, others of a various Kind being manumitted or let go, they are Variouſly imployed in the offices of the others; but of theſe, thoſe which are chiefly Subtil, as it were Beams of Light ſent from a Flame, are, as it were diſtilled into the Brain and Cerebel. Theſe moſt ſubtil particles are called the Animal Spirits, and firſt of all entring the Cortical Subſtances of thoſe parts, and from thence flowing into the *Meditullia* or middle parts of either of them, and into the Oblong and Spinal Marrow, and further into all the Nerves and Nervous Fibres, diſperſed thorow the whole Body, Conſtitute the other and more noble part of the Corporeal Soul, commonly called the Senſitive, by us the Lucid or Etherial; into whoſe Nature, as alſo into the ways of its Subſiſting, Acting, and Suffering, we ſhall now in the next place inquire.

The ſenſitive part of the Soul diviſible and extenſed.

Secondly, The ſenſitive part of the Soul, even as the Vital, is extenſive and diviſible; whoſe *Hypoſtaſis* when as the Animal Spirits, as to the Integral parts, do Conſtitute, a great and difficult queſtion ariſes, concerning them; of what ſort of ſubſtance they are, and from whence they are indued with ſo notable an Energy or Power? I ſhall ſay nothing to thoſe, who wholly deny theſe Spirits, for that the exiſtencie of which, is almoſt palpable, and may be proved demonſtratively by the effects; nor am I much ſolicitous of thoſe, who arguing Contend, that the Senſes and Faculties of living Creatures, however perceptive, cannot be but from an Immaterial and Immortal Subſtance, and therefore without any neceſſity, multiply almoſt to Infinity; and I know not for what end, not only Eſſences, but alſo immortal Souls of Brutes, yea, of Fleas, Flys, and of other, more vile Inſects. Againſt theſe Opinions there needs no other Argument, than that any one may conſider truly in every Brute or Man, the Organs of the Animal Faculties, than which certainly nothing in the whole nature of things, can be made more Mechanically, and with a more neat Artifice. The Brain and Cerebel, the two Roots of the Lucid part of the Soul, or rather the Fountains of the Primary Spirits, are placed in the top it ſelf of the Body, into which, when the Animal Spirits are diſtilled, from the Blood, placed above and round about, as it were by a deſcent; they from thence flow forth through the Medullary and nervous Appendixes, as it were by Bills or Pelicans placed here and there, into all the inferiour parts. Either head conſiſts of a double Subſtance, *viz.* a Cortical or Barkie, which for the moſt part ſerves for the reception of the Spirits; and a Medullary or Marrowy, which ſerves for their diſpenſation and exerciſe.

The Animal Spirits conſtitute its Hypoſtaſis.

The Brain and Cerebel, two roots of the ſenſitive Soul.

Further, as the Animal Spirits, for divers uſes of the Animal Faculties, ought to obtain Tendencies or Stretchings-forth of a divers ſort, within their diſtinct and peculiar paſſages, either Medullary part being wonderfully Divaricated, is cut every where into Various tracts of Labyrinths, as it were ſo many Conclaves and Chambers; all which Medullary tracts, the Cortical part every where lies between and fortifies; From theſe, as it were Primary Palaces of the Soul, the Oblong and Spinal Marrow, like ſpacious Courts are ſtretched forth, which alſo are furniſhed, by reaſon of the Medullary ſubſtances variouſly lying between, with many Porticoes and Walks, planted here and there, for the neceſſary works of the Animal Function: From theſe Marrows, the Nerves ariſing, are carried to the ſeveral parts of the whole Body, as it were ſo many diſtinct paths; then from theſe many other ſmall Shoots or nervous Fibres, being on every ſide ſent forth, as it were ſo many ſmaller or leſſer Paths, are almoſt innumerable; at the ends of which, others ſecondary Fibres, Membranaceous and Muſculous, are diſpoſed, though thick Series, as it were ſo many martial Fields, in every one of which is placed a Maniple or Band of Spirits. In this moſt ample and highly intricate Labyrinth of Cloyſters, and Animal paſſages, the Medullar or Nervous Proceſſes, how ſmall ſoever, being moſt thickly ſet, variouſly implicating one another, and ordinarily cutting croſs one another, yet all of them diſtinct, and deſigned to certain offices, allways agree mutually between themſelves, and intimately conſpire together; So that every Impulſe or Inſtinct, is carried from one end to another preſently, yea, from every part to all the reſt, ſooner than in the twink of an eye. Further, from the effects it is demonſtrated, that within theſe ſeveral tracts, ſome ſubtil particles do flow, and cauſe Animality or Life in all; which tho they be moſt thin, inviſible, and nimble, we rightly call the Animal Spirits, and the Conſtitutive parts of the ſenſitive Soul.

The ſubſtance of them two-fold viz. Cortical and Medullary.

To them are belonging the oblong Marrow, the ſpinal Marrow, Nerves, nervous Fibres.

Both Membranaceous and Muſcular.

A moſt quick Communication between all theſe Parts.

Altho it appears plain, that ſuch like Spirits are the Authors of the Animal Function, and do conſtitute the *Hypoſtaſis* of the Soul it ſelf; yet what they are according to their proper eſſence, ſeems hard to be unfolded; becauſe we can hardly meet with any thing in Nature, to which they may be compared in all things.

What the Animal Spirits are.

They are not well compared to ſpirits of Wine, Harts-horn, Turpentine, &c.

The comparing of theſe, with the Spirits of Wine, Turpentine, and Harts-Horn, and ſuch like, does not quadrate or agree. For beſides, that thoſe Chymical Liquors, neither repreſent the Images of their Objects, nor are indued with any Elaſtic Virtue, as the

the Animal Spirits; thoſe alſo are leſs Subtle than theſe, and leſs Volatil, for as much as they may be powred forth out of one Veſſel into another, or may be diſtilled; but the Animal Spirits preſently vaniſhing, after life is extinct, leave no Foot-ſteps of themſelves. Wherefore, it is better, according to our *Hypotheſis*, that we liken theſe Spirits ſent from the Flame of the Blood, to the Rays of Light, at leaſt to them interwoven with the Element and the Air. For as Light figures the Impreſſions of all viſible things, and the Air of all audible things; So the Animal Spirits, receive the impreſſed Images of thoſe, and alſo of Odors, and tangible qualities, and ſtay them at the firſt Senſory. But the Air, or Aerial particles, whilſt free and unmixed, create nothing of force or tumult, yet they being more ſtrictly preſſed together, ſhut up in Clouds or Inſtruments, or imbued with Sulphureous, and other Elaſtick Bodies, being become preſently raging, they often break forth into Meteors, *viz.* Winds, Hurricanes, and horrid Thunder. After the ſame manner, the Animal Spirits, whilſt pure, are carried in the open ſpaces of the Head, and its Appendixes remain quiet enough; but they being ſhut up within the Muſcles, and there being mixed with Sulphureous Particles from the Blood, and ſometimes in other places, with an heterogeneous matter, become very impetuous, to wit, Elaſtick, or Spaſmodick or Cauſing Cramps, as we have declared formerly at large.

Better to the Rays of Light interwoven with the Air, or the Element.

Therefore the Animal Spirits, according to this *Analogy*, (to wit, which thing of them happens chiefly and almoſt only with other things) we ſay are moſt ſubtil Bodies, and highly active, inſtilled from the inkindled Blood into the Brain, and its Appendix, which partly of their own nature, for as much as they are lucid and aerial, and partly from the agreeable furniture of the Organs, for that they are ſhut up within Paſſages, as it were Pipes and other Machines, abound with both an objective Virtue, by which many rays of Light promptly meet together in the Images of all ſenſible things, and effect the ſenſion of every Kind, and alſo, an Active, by which the loco-motive powers, and alſo the acts of the Spaſmodic Affections, are performed, beyond the forces or Inſtincts of wind, or any blaſt ſhut up in machines.

The Animal Spirits abound both in an Objective and an Active Virtue.

In Mechanical things, Fire, Air, and Light, are chiefly Energetical, which humane Induſtry is always wont to uſe, for the greatly ſtupendious, and no leſs neceſſary works. This the Furnaces of Smiths, Chymiſts, and Glaſs-men, and of other boylers of ſeveral Kinds, Dioptrick Glaſſes, Muſical, Warlike, Mathematical Inſtruments, with many other Machines, never enough to be admired, do teſtifie. In like manner we may believe, that the Great Workman, to wit, the Chief Creator, from the Beginning, did make the greatly active, and alſo the moſt ſubtil Souls of Living Creatures, out of their Particles, as the moſt active; to which he gave alſo a greater, and as it were a ſupernatural Virtue and Efficacy; from the Excellent ſtructure of the Organs, moſt Exquiſitly laboured, beyond the Workmanſhip and artificialneſs of any other Machine.

As Fire and Light in Mechanical things ſo in Animals, they are chiefly Energetical.

We have deſcribed theſe Parts formerly in Plates, ſo that we need not here repeat their Anatomy, but only add a few things that were omitted. In the Animal Government, altho the Spirits are diſpoſed, as it were an Army ſpread abroad thorow the whole Field, yet we ſay, that they obtain Orders and Offices, one thing in this part, and ſomething different in that. In every one of theſe we have noted, as it were a double Aſpect or Geſture, in the Provinces in the Medullary ſhanks of the Head, in the Nerves and alſo nervous Fibres, to wit, one of Begetting and Diſpenſing, and another of Exerciſe and Government.

A two-fold Action of the ſpirits in the Brain and its Appendix, 1. *Of begetting and diſpenſation,* 2. *Of Exerciſe and Government.*

As to the firſt, we have ſhown, that the animal ſpirits being procreated wholly in the Cortical or Barky ſubſtances of the Brain and Cerebel, do deſcend by and by into the middle or marrowy parts, and there are kept in great plenty, for the buſineſſes of the Superiour Soul; in the mean time, a ſufficient ſtock of theſe, gently flowing from this higheſt Province into the oblong and Spinal Marrow, and thence into the Nerves & Nervous Shoots, actuates all theſe paſſages, and blows them up into a certain Tenſity. Laſtly, a ſufficient plenty of Spirits, diſtilling forth from the ends of the Nerves, enter into the nervous Fibres, planted in the Muſcles, Membranes, and Viſcera, and ſo conſtitute them, the proper and immediate Organs of the Sence and Motion. After this manner, the Region of the whole Senſitive Soul being viewed, if we would deſcribe its *Idea* or Image, we muſt altogether repreſent the ſame Figure and Dimenſion, and the whole Head with its Syſtem and Appendix; ſo that as we may behold all theſe parts, ſhaddowed in the ſame Image, we ought to frame at once, the *Hypoſtaſis* of this Soul, adequate and Co-extended to them.

The reaſon and manner of the former.

As to the ſeveral ſorts of Offices and Exerciſes of the Spirits, ſo planted in diſtinct Provinces, Firſt, we deſervedly attribute to them a two-fold Aſpect, to wit, inward for Senſe, and outward for Motion: But more particularly, we may conceive the middle or Marrow part of the Brain, as it were the inferiour Chamber of the Soul, glaſed with

The diſtinct Offices of the ſpirits in various Provinces.

with dioptric Looking-Glasses; in the Penetralia or inmost parts of which, the Images or Pictures of all sensible things, being sent or intromitted by the Passages of the Nerves, as it were by Pipes or strait holes, pass first of all thorow the streaked Bodyes, as it were an objective Glass, and then they are represented upon the Callous Body, as it were upon a white Wall; and so induce a Perception, and a certain Imagination of the thing felt: Which Images or Pictures there expressed, as often as they import nothing besides the mere Knowledg of the Object, then by and by further progressing, as it were by another waving, from the Callous Body towards the Cortix or shell of the Brain, and entring into its folds, the phantasie vanishing, they Constitute the memory or remembrance of a Thing: But if the sensible species being impressed on the Imagination, promises any thing of Good or Evil, presently the spirits being Excited, respect or look back upon the Object, by whose appulse they were moved, and for the sake of embracing or removing it away, by other spirits flowing within the Passages of the Nerves, and successively by others implanted in the Members and moving Parts, they swiftly give their Commands of performing the respective motions. So the Sense brings in the Imagination; this the Memory or the Appetite, or both at once, and at length the appetite stirs up local motions, performing the prosecution or driving away of the appearing Good or Evil. For the several Kinds of these sort of Animal Functions, yea for the Various Acts of either Kind to be performed, the Animal Spirits, who are the immediate Instruments of them all, obtain peculiar and distinct tracts or paths; within which, if there be any let or bar to hinder, presently some function is hindred, or some member of the sensitive Soul, being as it were cut off, becomes impotent.

The perception of Sensions in the streaked Bodies.

The Imagination, Phantasie, and Appetite, in the Callous Body.

The memory and remembrance of a thing or reminiscency within the folds of the Brain.

The series and order of their powers.

Who can sufficiently admire the innumerable series of nervous Fibres, distributed in a most wonderful order thorow the several parts of the whole Body; in which the animal spirits, like Soldiers sent abroad, perpetually running up and down, on this side and on that, perform the offices of Sense and Motion. Further, those who dwell within the Head it self, the superior Legion of the sensitive Soul, altho more freely ranging, yet lye not disorderly or loosely, but its numerous Company, being limited with certain Bounds and Cloysters, as it were within the narrow space of One Chamber, perform infinite Variety of Actions and Passions.

The tracts or paths of the Spirits, are distinct within the head it self, even as within its nervous Appendix.

Concerning these, discoursing formerly more fully in our description of the Brain and Nerves, we did distinguish the Seats of all the Faculties, yea we did shew the Commands of the Animal Function voluntary and involuntary, to be divers in themselves, also to belong to divers Governments of the Brain and Cerebel, with their respective appendixes of the Nerves. Further, we shewed that those Spirits, the Authors of either function, not only within the narrow Channels of the Nerves, but also in the large meeting places or *Emporiums* of the Head, have peculiar paths, to wit, the medullary tracts, as it were intrinsick Nerves, most curiously stretch'd forth here and there. But indeed, because it is objected, that I have not described all, and perhaps not exactly enough; therefore, that those medullary Passages may be the better beheld, we have lately instituted another more accurate anatomy of the Brain; to wit, by gently scraping with the point of a Pen-knife its parts, we removed every where the softer and brownish substance, a-Kin to the *Cortex* of the Brain, the whiter and more hard being left; by which means, in several places of the Brain and the Oblong Marrow, many Medullary Chords or Strings, as it were distinct Nerves, wonderfully Communicating among themselves, and with other white or medullary Bodies, were brought into sight. For as much as this Anatomical Administration, render'd the more secret passages of the Spirits, and the motions belonging to the Arcana's of the animal Government, very Conspicuous; we shall here shew a new Figure or two of the Brain rolled forth, and the flesh when taken off in the chief places; in which are plainly beheld, both the Common Passages, and the Private paths of the Spirits, and which carry them backward and forward, immediately thorow the beaten way of the medullary tail, and which lead thorow the by-paths of the Prominences, into the streaked Bodies.

Every where the various Medullary tracts, are distinct from the Cortical.

A more exact Anatomy of the Brain, through its Cortication or Shelly part.

The Common passages, and the private pathes of the Spirits.

Therefore, in the Brain taken out, and rolled abroad according to our Method, let there be a dissection so made, between the Orbicular Prominences, to wit, between the *Testes* or Testicles, *Nates* or Buttocks, that when they being whole, and divided in the middle of the Pinal *Glandula*, the parts are layed by themselves, the streaked Cavity of either may be lay'd open. (As in the 6*th* Table, Fig. 1. A. b, E. A. b. c. c. D.) Then it will easily appear, that the said Prominencies, called the *Testes*, are marrowy *Epiphyses* (or additions) of the oblong marrow, which sticking to the tails of the Cerebel, from thence look towards the Brain, and a Commerce is seen to be maintained between this and that.

To wit, which thorow the orbicular prominences, are the Testes *and* Nates.

This last *Ephiphysis*, passes from the parts of the Brain, into the next *natiform* (or of the form of a Buttock) *B.* which is an adjunct, or some Augmentation of that: To this

Medullar *a.a.* in a Sheep, Ox, and many four-footed Beasts, grows a Cortical substance *B.B.* But otherways in a Man, Dog, Fox, and other more sagacious Creatures, it is marrowy thorow the whole; the reason of the difference, I have shewed in another place.

The description and use of them.

This medullary *Epiphysis* reaching above the *Testes* and *Nates*, and going under the Pineal Kernel, tends towards the Chambers of the Optick Nerves; approaching which (*F.*) by and by it is cleft into two Branches, as it were Nervous, one of which *G*, is carryed to the Cone of the streaked Body, and the other *H.* towards its Basis, and in its oblique passage, sends a shoot into the midst of the Border of the streaked Body: this Branch going to the basis of the streaked Body, behind the root of the *Fornix*, is inserted into an Angle of the streaked Body.

From these; Medullary tracts into the streaked Bodies.

And wherefore.

As to the Use of these Parts, we have proposed our Conjectures in our Tract of the Brain; and truly nothing seems more probable, than that by this side-path of the Prominences, and by the Passage of the Medullary Passages, there are Commerces held between the Brain and the Cerebel; for as often as it happens, that Impressions or Instincts meerly natural, follow spontaneous Affections and Motions, or are joyned to them, all that, within those private Tracts, is occupied. See our *Anat. of the Brain*, p. 176. Further, whereby every such Impression from the Viscera or Precordia, by the mediation of the Cerebel, are carried from them in the same way forward and backward, into the streaked Bodies, and on the contrary every force and perturbation; The Medullary passage, which is for their commerce, enters in three places, *viz.* In the middle, and at either end, into the streaked Bodyes.

To the orbicular Prominences, succeed the Chambers of the Optick Nerves.

To the Prominences which are called *Nates* and *Testes* succeed the Chambers of the Optick Nerves *E. E.* as also above the Medullary Trunk, certain *Epiphyses* or Additions, serve for a private office *viz.* only for the visive Function. For as the sight is a most noble faculty, and as the Organ of the eye is highly curious, so it obtains a very spacious Furniture or Porch, and also a very strait, to the common Sensory, *viz.* the streaked Bodies: Because the Optive Nerves coming together, under the Trunk of the oblony Marrow, and being by and by disjoyned, they climb up his sides, where going under the appropriate Protuberances, they go into a numerous company of hairy threads, which

The description of them.

are every where interwoven with the cortical Substance. *Fig.* 2. *Tab.* 6. These Medullary or Nervous structu res or bindings, which without doubt the visible Species pass thorow, are all parallels, which being stretched forth Strait, are brought to the streaked Bodies, every where, through their whole Compass. *Fig.* 2. Hence it is probable, the causes of the Sandy drops or Spots, yea, and of the sight otherways depraved or lost, do lie hid, not only in the Eye and Optick Nerve, but sometimes in these parts; for as much as those Filaments or Nervous threads, being obstructed or bound together, the visible Species are not able to beam themselves to the streaked Bodies. I knew one, being affected, by his Imagination and Memory being grievously hurt, that those diseases vanishing, fell into blindness: The reason of which accident seems to be, that the morbifick matter occupying at first the superior frame of the Brain, being slid thence lower by the Cortix, at length enter'd into the Optick Chambers.

The use.

The Mamillary Processes, are carried by a private passage, to the streaked Bodies.

There remains yet a private passage of another sence, to wit, of the smelling, to the common Sensory, *viz.* the streaked Bodies; The mamillary Processes being entered into the Prominences of the Inferiour Brain, go under its Basis till they come to the border of the streaked Body on both sides, then being a little bent inwards: they proceed by an oblique passage towards its Basis, where they are inferted. *Fig.* 1 *Tab.* 6.

The common passage of the Spirits, to the streaked Bodies, is made by the shanks of the oblong Marrow.

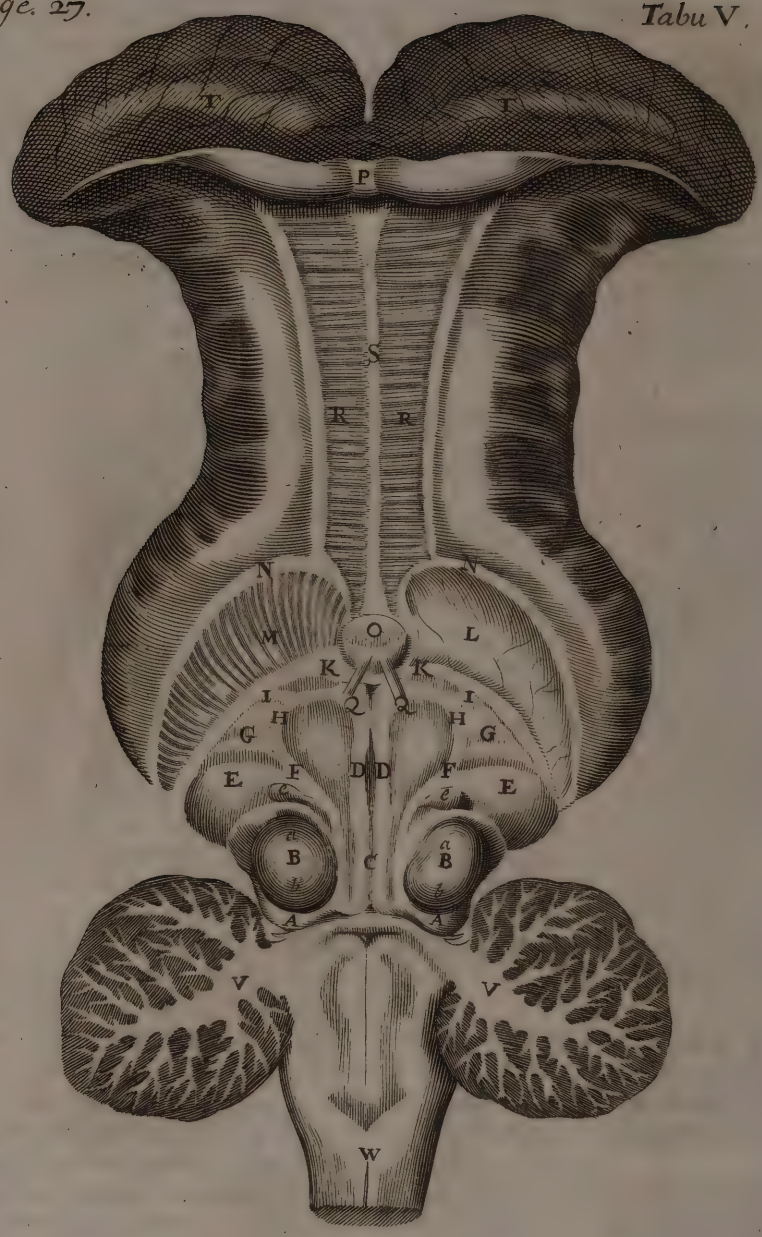
As to the Impressions of the other Senses, and to the force and Instinct of every Spontaneous motion, carried up and down, there is a necessity, that all these Kinds of Commerces, between the streaked Bodies and the Nervous Appendix, should be made by the Shanks of the longish Marrow: The tops of these being large and broad, Stick to the hindermost borders of those, so that from these into those, and so on the Contrary, a going and returning is easily performed. Further, that the many and divers motive and Sensible Forces and Impressions together, may be carried without confusion, by this beaten and common way, the whole frame of the Medullary Shanks, appears thorow the whole to be made with Nerves or Medullary strings compacted together; as if they were so many distinct paths, in this common passage of the Animal Spirits, for the inculcating the Various acts of the Senses and of Motions. The Sixth Table represents these parts to the Life.

An accurate description of the striated or streaked Bodies.

The chamfer'd or streaked Bodyes, consist of a most exquisite and greatly to be admired Fabrick: The figure of either, coming something near the Cone, appears like a Cone reflected and bent inward; the outmost and superior Superficies is round and Barkie, thorow which creep Blood-carrying Vessels, and a portion of the *Chorœdal* Infolding hides it; The middle and Inferior frame of them consists of a Medullary Substance, with a Cortical mixed between. Tab. 8*th* l. m. The sides or either border of these, both the

Superior

page. 27. Tabu V.



Superior and Inferior, are for the moſt part Marrowy, and look white like the greater Nerves; n. K. Between theſe ſtreaks or Marrowy ſtrings, thick ſet, and of a divers magnitude, being ſtretched forth like the greater Nerves, Knit together, both the Borders: The anterior Border n. n. is every where knit to the Callous Body; ſo that whatſoever is to be carried forward and backward by either, *viz.*, from one to another, we ſuſpect they have for it this paſſage between thoſe Medullary paſſages. The hindermoſt Border of the ſtreaked Body, in its upper part, receives the Medullary Proceſſes ſent thither from the round Prominences, and alſo the Optick Chambers, into its Boſome: In the middle and loweſt part, either Border is fixed to the Shanks of the oblong Marrow; and nigh to the Baſis of the Fornix, the inferior Border of one ſtreaked Body, is continued into the other Border; to the end, that theſe Bodies alſo might have between themſelves a mutual Commerce, which is alſo obſerved almoſt of all the reſt of the Parts of the Head, that they are double, and do communicate among themſelves, by certain paſſages; ſo that if one part ſhould be faulty, its defect might be made up by the other being whole.

The uſe or Offices of the ſtreaked Bodies.

As to the Offices and Uſes of the ſtreaked Bodies, though we can diſcern nothing with our eyes, or handle with our hands, of theſe things that are done within the ſecret Conclave or Cloſſet of the Brain; yet, by the effects, and by comparing rationally the Faculties, and Acts, with the Workmanſhip of the Machine, we may at leaſt conjecture, what ſort of works of the Animal Function, are performed in theſe or thoſe, or within ſome other parts of the Head; eſpecially becauſe it plainly appears, that the Offices of the Interior Motions, and Senſes, as well as the Exterior, are acted by the help of the Animal Spirits, ordained within certain and diſtinct Paths, or as it were ſmall little Pipes.

They receive the Impreſſions of ſenſible things: and convey the Inſtincts of Motions.

As therefore it appears from what we have ſaid, that the chamfered or ſtreaked Bodies are ſo placed, between the Brain and Cerebel, and the whole nervous Appendix, that nothing can be carried from theſe into that, or on the contrary be brought back hither, but it muſt paſs thorow theſe Bodies; and as peculiar paſſages lead into theſe moſt ample Diverſories, from the ſeveral Organs of Motions, Senſe, and the other Functions; and further, as Paſſages lie open from theſe into the Callous Body, and into all the Marrowy Tracts of the Brain, nothing ſeems more probable, than that theſe parts are that common Senſory, that receives and diſtinguiſhes the Species, and all Impreſſions, transferrs them, being ordained into fit Series, to the Callous Body, and repreſents them to the Imagination there preſiding; that alſo tranſmitts the Force and Inſtincts of all ſpontaneous motions, begun in the Brain, to the Nervous Appendix, to be performed by the motive Organs. By reaſon of theſe manifold and divers offices, ſo many Marrowy ſtreakes or internal Nerves are produced within the ſtreaked Bodies, for the Various Tendences and Beamings forth of the Animal Spirits, it may very well be concluded that the Senſitive Soul, as to all its Powers and Exerciſes of them, is truly within the Head, as well as in the nervous Syſtem, meerly Organical, and ſo extended, and after a manner Corporeal.

The Explanation of the Figures.

The Fifth Table,

Shews the Figure of the Brain of a Sheep roled forth, and deraſed, and as it were made bare of the Fleſh, in many places, that the Marrowy Tracts may be ſeen.

A. A. *The Medullary Protuberances called Teſtes, which being certain* Epiphyſes *or excreſcences of the oblong Marrow, and joyned to the Trunks of the Cerebel look thence towards the Brain.*

B. B. *The Natiform Protuberances, the Subſtance of which in a Sheep, a Goat, and many others, is partly Cortical,* a. a. *partly Marrowy,* b. b. *in a Man, Dog, Fox, and others it is wholly Marrowy.*

C. *The Cavity or Ventricle, lying under the Prominences, which is lay'd open, theſe being diſſected and opened.*

D. D. *Two Marrowy Chords or Strings of the Medullary Trunk, going ſtrait to the ſtreaked Bodies.*

E. E. *The Chambers of the Optick Nerves.*

e. e. *The parts of the pineal Kirnel, cut thorow the midſt, and laid apart.*

F.F. *The Medullar or nervous passage proceeding from the Prominences, which presently becoming forked, sends forth one branch* G. *to the Cone of the streaked Body, and the other* H. *to its Basis.*

I. *A shoot from the medullary Branch, going towards the Basis of the streaked Body, reaching into the midst of its Border.*

K. *The latter border of the streaked Body, receiving the nervous passages, and under the root of the* Fornix, *united to its like Border of the other side.*

L. *The whole streaked Body with its Vessels creeping thorow its Cortex or shell.*

M. *The other streaked Body, with the shell scraped off, that the Nerves or marrowy Tracts may appear.*

N.N. *The foremost border of both the streaked Bodyes, Conjoyned to the Callous Body.*

O. *The Basis of the* Fornix.

P. *The Trunk of the* Fornix *Cut off, and with the Brain rolled out, removed at a distance.*

Q.Q. *The two roots of the* Fornix.

R.R. *The interior superficies of the Callous Body, noted with transverse medullary streaks.*

S. *A medullary hedg or mound, dividing the streaks of one side, from those of the other.*

T. T. *Portions of the Brain Cut off and rolled forth, which (as also its whole Frame) appears with a marrowy, and a Cortical substance intermixt.*

V. V. *Portions of the divided* Cerebel *lay'd apart.*

W. *The Portion of the Oblong Marrow situated beyond the* Cerebel.

The Sixth Table,

Shews the Basis of a Sheeps Head, in certain parts of which Derased, and in others Exposed naked, the Streaks or Medullary Tracts, as so many Nerves, appear.

A.A. *The Mamillary Processes carried to the Basis of either Streaked Body, and inserted into them.*

B.B. *Some remaining portions of the Brain cut off from it greater bulk.*

C.C. *The streaked Bodies derased, and as it were made bare of flesh, that the Medullary streakes may appear also in its lower parts.*

D.D. *The Chambers of the Optick Nerves, in which the strait and thick-set Medullary streakes, are reached forth, towards the streaked Bodies,*

E. *A Tract leading to the Tunnel of the Brain.*

F. *A Kirnel placed behind the Tunnel, which is twofold in man.*

G.G. *The Trunks of the Optick Nerves divided, and removed, from their joyning together before the Tunnel.*

H, H. f. f. *The Shanks of the oblong Marrow lying under the Orbicular Prominences, in which strait and most thick streakes are also stretched forth towards the chamfer'd Bodies.*

I.I.I. *Transverse Medullary Tracts distinguishing the regions of the oblong Marrow.*

K.K. *Ringy Processes compassing about the oblong Marrow, nigh the Cerebel.*

L. *The extremity of the oblong Marrow going into the Spinal.*

M. *The Top of the Spinal Marrow.*

The Seventh Table,

Shews the orbicular Prominences, and the Optick Chambers Erased, and as it were made bare of Flesh that their inward Frames may be beheld.

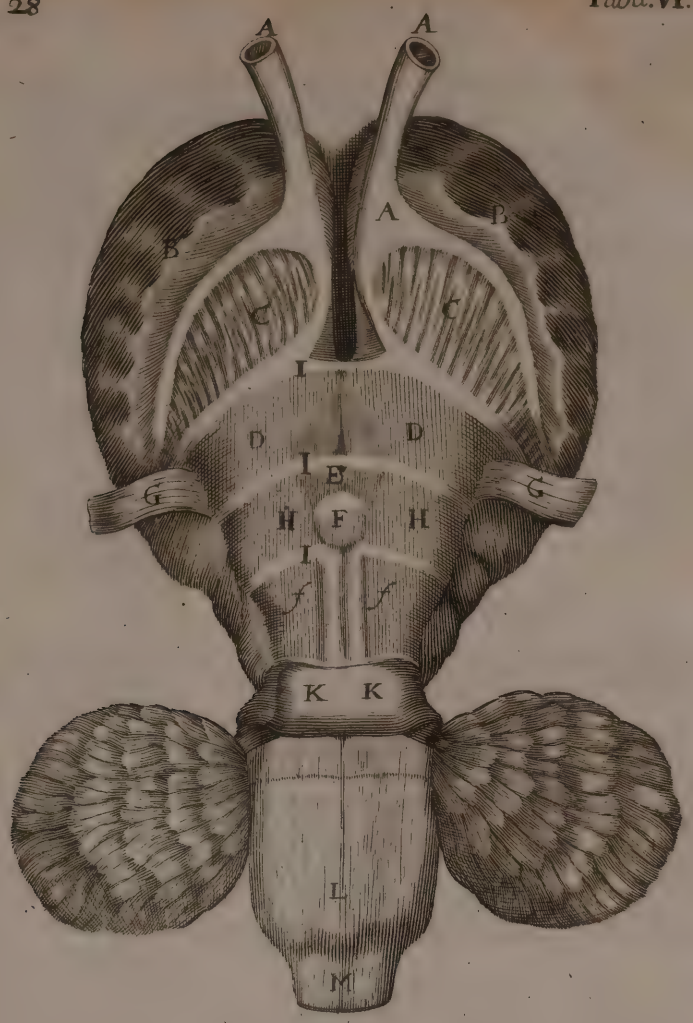
A.A. *The Testes, which thorow the whole being Medullar, are marked with strait Fibres.*

B. *The Nates, one of them being Derased, in which the strait and thickest Medullary streakes, are stretched forth towards the Brain.*

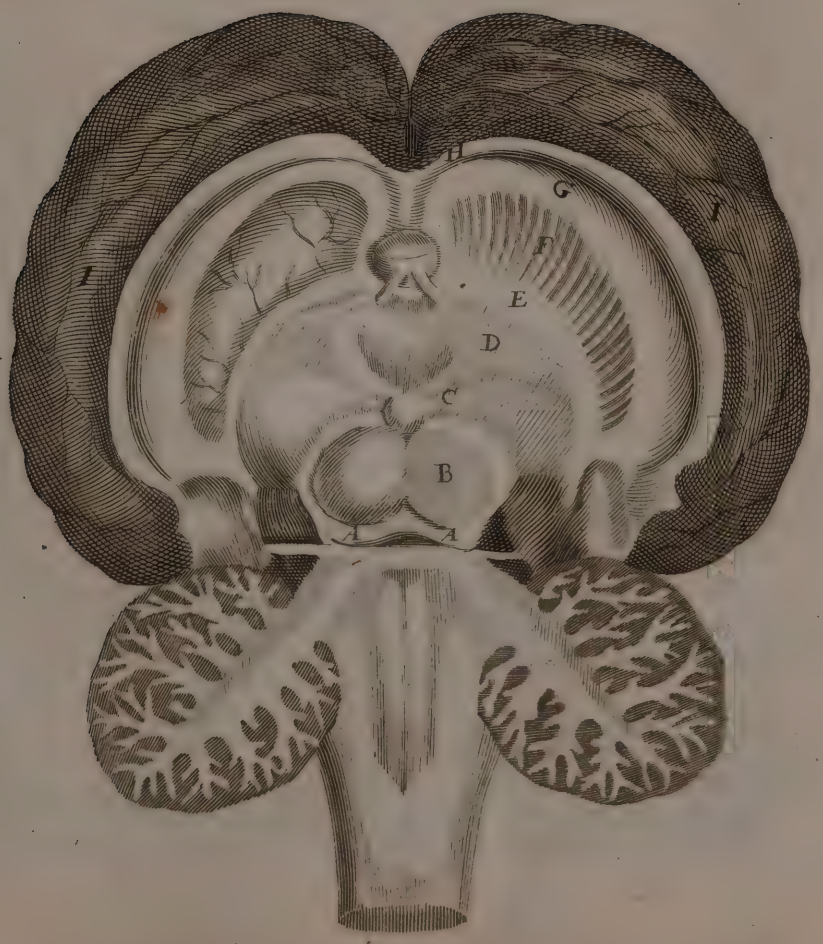
C. *The Medullary Hedg or Mound, dividing the Natiform Prominences from the Optick Chambers, and from which, one Medullary Proces is carried into the Basis of the streaked Body, and the other into its Cone.*

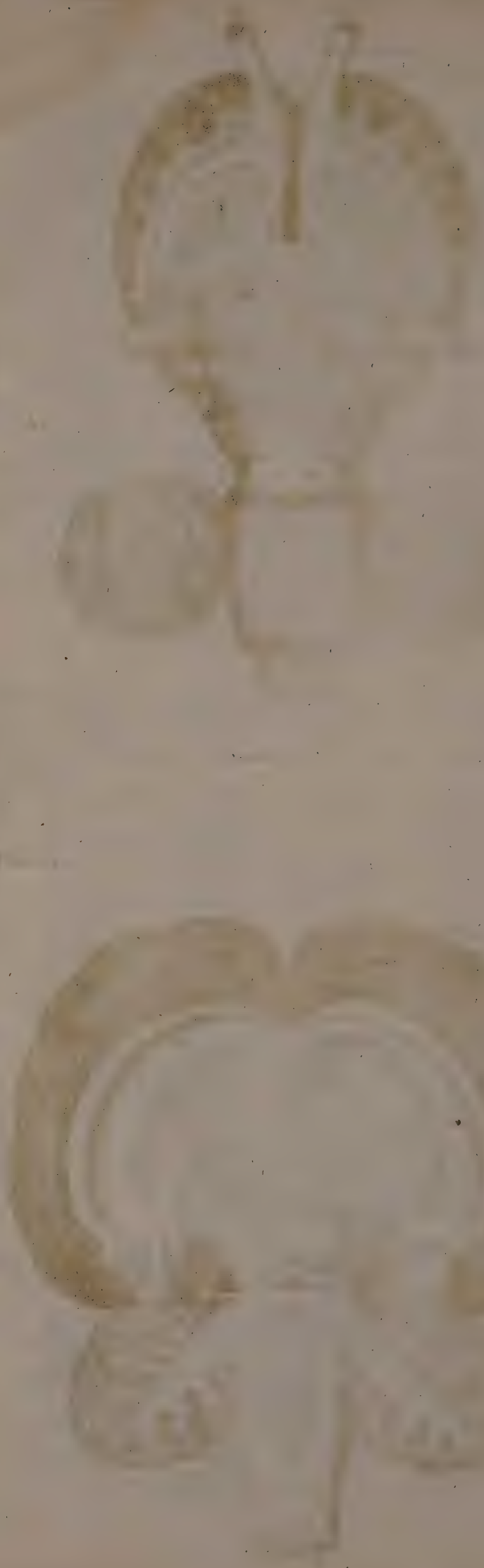
D. *One Optick Chamber scraped, that its straight and most thick-set streakes, stretched forth towards the streaked Body, may appear.*

Tabu. VI.



Tabu. VII.





E. *The hinder Border of the ſtreaked Body, receiving the Optick & Medullar ſtreakes, and other Medullary Proceſſes.*
F. *The ſtreaked Body decreaſed, whoſe little Medullary Nerves and Paſſages, are explained in the* 5th. *Table.*
G. *The foremoſt border of the ſtreaked Body.*
H. *The Boſome, leading from the Mamillary Proceſs into the Ventricle of the forepart of the Brain.*
I.I. *The Hemiſphear of the Brain opened and ſeperated by it ſelf.*
The reſt here deſcribed are explained in the former Figures.

CHAP. V.

The Beginnings and Increaſe of the whole Corporeal Soul; alſo ſome Innate Habits and Inclinations of it are noted.

FRom what has been ſaid, concerning the *Hypoſtaſis* and Members of the Corporeal Soul, or of the more perfect Brutes (which is alſo the inferiour Soul of Man) it will be eaſier to trace out the Original, and the Increaſe of the whole. From hence alſo we may collect its figure and dimenſions, as alſo the proportion, habits, and inclinations of its parts, in reſpect of it ſelf, and the members of the Body, together with its Various ways of acting and ſuffering.

The beginning of the Brutal Soul.

As to the firſt beginnings or original of the Corporeal Soul; this, (like as a Shell-fiſh forms and fits its ſhell to its ſelf) exiſts ſomething a little ſooner, and ſo more nobler than the organical Body; Becauſe a certain heap of animal Spirits, or moſt ſubtil Atoms, or a little Soul not yet inkindled, lies hid in the Seminal humour; which having gotten a fit cheriſhing or Fire-place, and at length being inkindled from the Soul of the Parent acting, or endeavouring, or leaning to it, as a flame from a flame, begins to ſhine forth, and to unfold it ſelf, a little before the Foundations, or firſt ground-work of the body is lay'd: This orders the web of the conception, agitates and inkindles the applyed matter, diſpoſes, and by degrees forms the Figure, deſigned by the Archetypal Law of Creation. In this ſtupendious Fabrick, together with its bodily bulk, being daily increaſed, and Imaged into the due Species of each animal, the Soul alſo takes its increaſe, and ſtill renders it ſelf like to the Body, which it forms. For when as the more thick particles, from matter continually put together, are beſtowed in the Corporeal Organs; in the mean time, the more ſubtil and ſpirituous being looſned, and more rarefied, by the burning of the others, they dilate the *Hypoſtaſis* of the Soul, and together with the Body unfold, and equally extend it. But that after this manner, the Seeds of the Soul being laid, from the beginning, together with thoſe of the Body, do riſe up to a due figure and bulk in either, it ought not to be attributed to the fortuitous concourſe of Atoms, nor to the proper Energie of the Soul it ſelf; but the beginning of all things, proceeds wholly from divine Providence, directing Generations, to the Ends and Ideas of Forms, according to the original Types primitively ordained by the ſame.

Frames it ſelf before the Body.

And increaſes likewiſe with it.

The duration alſo of the Body depends upon the Soul.

Secondly, As the Increaſe of the animated Body, and the firſt marrying together of the Elements proceed from this Soul, informing and diſpoſing the matter; ſo the duration and ſubſiſtence of the ſame Soul, is the Bond of its Mixture or Concretion. For the flame of the Soul being extinct, or the inkindling and motion of the ſubtil particles ceaſing, preſently the frame of the Body it ſelf begins to be diſſolved and looſned, ſo that in a ſhort time, the Elements being looſned and laxed one from another, fly away, and by degrees break their Concretion: wherefore this Soul, as it were ſalt or pickle preſerves the fleſhy bulk of the Body from putrefaction; yea, the ſame is almoſt in an animated Body, as the Flower or Spirit in Wine, which indeed being preſent, and unfolding its ſpirituous Particles thorow the whole, the Liquor continues ſtill generous and flouriſhing; but as ſoon as this Spirit of the Wine flies away, forthwith the remaining water or liquor degenerates into an inſipid and dead thing.

The Soul always Born.

Thirdly, So long as this Soul ſubſiſts in the Body, according to an ancient ſaying of *Hypocrates*, *It is always Born, even till Death*; In which reſpect alſo, it ſeems to be moſt like flame, or rather the ſame thing, which is continually renewed almoſt every moment: Some parts of eithers ſubſiſtence, in like manner are conſumed by burning, and fly away, and others in the mean time are laid up anew, from the Food continually laid in: For as the

more

more Crass or thick Particles of the nourishing juice, wrought in the Viscera, fill up the losses of the Corporeal bulk, so the more subtil make up the layings forth or wastings of this Soul; which, as they come to the blood, are as it were Oyl to a Lamp, and being perpetually inkindled within its bosom, restore to the Soul both Flame and Light, which would otherways perish. For whilst the purer part of the nourishing Liquor, cherishes the flame of the Blood, and sustains it, the most spirituous Particles falling off by its burning, are instilled into the concavity of the Head, which there propagate and nourish the other part of the Soul, to wit the Sensitive: So the making of Blood, is owing very much to Chylification, or the making of the Chyle, and Animality or like to this; notwithstanding which offices, the Animal Function payes back to the Vital, and both to the Organs of Chylification; for as much as the Animal Spirits, bestow a pulsifick force to the Heart and Arteries, whereby the Blood may be agitated and carryed about, to the places of accensions or inkindlings: yea, the Viscera of Concoction, receive heat which they want, from the flame of the Blood, and a motive and sensitive virtue, which they have need of, for their Offices, from a Constant afflux or flowing in of the Animal Spirits; so the Brain is indebted to the Heart, and both of them to the Stomach, yea, and on the other side, this Region to that, and both to the third. To the end that the *Hypostasis* of the whole Soul might the longer continue, the Tributes of all the Parts are Compensed with mutual Offices one to another, and so at once the members both of the Body and of the Soul being conjoyned, by a Circular necessity, they desire and shew their mutual Labour.

The Offices of the Organs and Faculties, are reciprocal towards one another.

Fourthly, The Soul of the *Brute*, as it is Fire, according to Philosophy, has these two innate Dispositions by the Law of Creation, to wit, that it should defend it self, or delay its proper inkindling long, for whose sake it is still careful of taking of food; and also, that it might propagate its Species, or produce other Souls; for which end, it Continually lays up from its provision, an incentive matter, and Continually desires to expose it to an inkindling.

It is natural to the Soul to defend it self, and to propagate its species.

It is natural for every Animal, without guide or example, to take its proper food, and to Swallow it down, both that the web of the Body being daily increased, might grow to its due magnitude, and also that the Soul, as it were its woof, being daily supplyed with new plenty of Spirits, may be able to be Coextended or stretched forth equally with the Body, and able to perform lively the Acts of its Functions. Then assoon as the Lineaments, both of the Body and the Soul, being sufficiently drawn forth, and the Compass and Bulk of each Compleated, some Animal Spirits, superfluous from the individual work, begin to abound, and so seperate into the genital parts, with a Subtil humour, picked from the whole Body, as it were into a Store-house, destinated for the propagating the Species, and there being lay'd up, forme the Idea of the Animal, which afterwards is transferred into a fit Matrix, for to be perfectly formed.

Hence the young one as soon as it is born, seeks for food.

When the Individuum is made the genital humor, for the propagating the Species, is lay'd up.

The genital Humour, is not, as *Hippocrates* formerly taught, and as now commonly believed, carried from the Brain into the Spermatick Vessels; for no peculiar passages lye between that, and these Bodies far remote; but without doubt, the bloody mass it self, sends its most noble part into the Genitals, as well as into the Brain. Wherefore, when as there are no Nerves that reach to the Testicles, and that there are noted Arteries sent, and admirably made thorow wandering Passages and frequent engraftings of the Veins; to wit for that End, that they may carry the most pure flower of the Blood, as it were thorow the winding Chanels of an Alembick, distilled by a long passage, and so wrought and made most highly subtil, into those parts: what is superfluous of this or less clarified, the Veins do not only receive and carry back, but also because from the much Spirit, a great quantity of Serous water (which serves always for its Vehicle) abounds, therefore the Water-Carryers are produced in these parts abundantly more than in any others.

The Genital Humor, not from the Brain, but from the Blood.

But that a great loss of the genital Humor doth hurt very much the Brain and the Nerves, and bring to them a notable debility; the reason is, because the blood as it makes up the losses of the seed, destinated for the propagating its Species, carries thither and bestows whatsoever is most precious of its own; in the mean time, as the Brain is defrauded of its due provision, by the great plenty of Spirits being carried into the Spermatic Bodies: yea as the blood is not able sufficiently to impart to the Genitals, out of its proper store, it remands or snatches its Tribute from the Brain and other parts, that it might be there bestowed; so that not seldom the strength of the whole Soul and Body is consumed, on the mad insatiate fulfilling of Lust or Venus; and in these desires, every one, or the unskilful, complains of Flames, and feels the blood not only to flame forth, but a greater fire increasing, to make hot the marrow, yea oftentimes it is known to burn up the Flesh, Inwards, and Bones, and to reduce them to a rottenness.

why the loss of seed disturbs the Brain and Nerves.

As

As to that most quick and Intimate Commerce of the brain, with the genital Members, for as much as the Venerian imagination Causes presently an insurrection in these parts, and on the other side a swelling up of the seminal humor, stirs up the Venerial Imagination, the Cause is, not an Instinct thorow the private passages of the Nerves, (which are wholly wanting) reciprocated from this to that; but, because for the Act of Generation, greatly necessary, and performed with a most vehement Affection, one part of the soul by it self, or one part after another is not moved, but the whole *Hypostasis*, together, and on a sudden, and is inclined or snatched towards the Genitals; hence every most light incentives of Lust, are most swiftly powred forth thorow the universal parts of the Soul, fiery of themselves, and Extreamly perclive or apt for such fires.

From whence is this Wonderful Commerce of the Brain, with the Genital Members.

Whilst this Corporeal Soul, being inkindled like flame, in the animated Body, on every side diffuseth Heat and Light, we may take notice of its various tremblings, shakeings, inequalities, and irregular Commotions; these sorts of Irregularities, to be observed, concerning the *phasis* or appearance of this Soul, of which we treat, tho they are more perspicuous in Man than in Brute Animals, yet they altogether respect the inferiour Soul of Man, which is Common to him with the Brute Animals. But that we may briefly handle some of these Affections of the Corporeal Soul, first it is to be noted, that its flame does not always flame forth equally: For besides that its food is sometimes afforded more plentifully, and too sulphureous, sometimes more thinly and less inflameable, so that the Flame is inlarged or Contracted, its accension also, in the præcordia, tho of it self moderate and equal, is wont to be variously shaken, by the fanning of Passions, so that it is carried forth sometimes into an Excessive burning, as from Anger and Indignation; sometimes this vital flame is in danger to be always blown out, as by sudden Joy, and another time almost suffocated, as by sudden fear or sadness; In like manner the *Systasis* or Constitution of the Soul, from the rest of the Affections, being exposed as flame to the winds, is diversly changed in its appearance, as will more clearly appear, when we shall speak particularly of its Affections.

The Soul, like Flame, has inequalities Trepidations &c.

The Flame of the Soul is sometimes enlarged by passions.

Sometimes Contracted

Nor do these sorts of Inordinations only proceed from the sudden impulses of Passions, but sometimes, the Vital flame, habitually becomes decayed, weak, and as it were half exstinct, as by intemperate Cold, and also as is observed in the phlegmatick disease, the dropsie, longing of maids, and other diseases; in whom the Blood being too watery, like moist and green wood, sends forth but a small and inconstant flame and almost overwhelm'd with fume and vapour: But sometimes the bloody Liquor being more sulphureous than it ought, is almost wholy inkindled, as happens in a Choleric Complexion, and in an intemperate Feavor: According to either of these hights, as the inkindling of the vital flame is altered, so the lucid particles, which flow from it, to wit the beamie texture of the Animal spirits, diversly shines, and breaths forths from the decayed or bound up inkindling of the Blood, the sphear of the sensitive soul is seen to be straitned, and to be drawn in, within the limit of the Body, and to be immerged or sunk down so that it doth not sufficiently actuate or illustrate the whole frame of the Brain, and its Appendix: On the Contrary, when the Vital Fire is very strong (so it doth not burn forth too much and feavourishly) the Constitution of the Animal Spirits being made greater in it self, is much inlarged forth far beyond the Compass of the Body, so that any one exulting for Joy, or blown up with pride, is seen to grow very great, and not be able to be contained within its proper Dimension.

The same habitually is now decayed.

Now intense or strong.

Also the lucid part of the Soul shines diversly.

And is altered on the part of the Fame.

Besides these Kind of Alterations, which the Soul properly sensitive, or the lucid part, receives, from the Vital and flamie, variously changed; many other things happen, which disturb its *Systasis* or Constitution, and its wonted manner of Order, immediately both from a certain affection of the Brain, and Nervous stock, and also from external Objects because in the night, the Brain it self, from a too great infusion of the nutricious Juce, or from the black darkness, or vapours, is filled, so that the lucid part of the Soul in sleep, is wholly obscured, as it were with darkness; not seldom from a morbific matter somewhere gathered together, and as it were obstructing the Spirts, or the ways of their Beams, there arises an Eclipse of some or more of their faculties; sometimes the Animal Spirits themselves are not light or airey enough, but are infected with heterogeneous effluvia's, to wit, either Saline, Vitriolic, Nitrous, or otherwise Cloudy, which deform the sensible species, change them into some affrightful thing, and excite inordinate Motions: Hence it comes sometimes that the whole Soul suffers various Metamorphoses or Changes, and puts on strange species's; as often happens in Melancholy diseases, or to mad men.

Also from the Various affection of the Brain and Nervous stock.

As to the various gestures of the Soul, by which for the variety of sensible objects it expresses now Joy and Pleasure, by and by loathing and trouble, it is observed, that sometimes it is allured more outwardly by the Organ of this or that sense, and as occasion serves almost wholly to wander into the Eye or Ear, Palate or any Sensory meeting with some-

Also from the various incursions of sensible things.

ſomething pleaſant; ſometimes on the Contrary, for the ſake ſhunning or flying away from ſome approaching evil, that ſhe retires inwardly, and leaving her watch, hides her head; ſo that we think or Imagine nothing without being touch'd, but that the whole Soul almoſt is moved, and trembles at every apprehenſion of the ſenſible object, and its *Syſtaſis* is variouſly agitated, as it were the leaves of a Tree, expoſed to the blaſts of Winds.

Alterations of the Flamy part of the Soul impreſſed by the Lucid.

Nor do theſe ſenſible Impreſſions induce Metamorphoſes only to the ſenſitive ſoul, or the beamy Texture of the Animal ſpirits; but undulations or waverings being brought to it, preſently they go forward, and impreſs alterations on the vital Soul, lying in the blood, and move about its flame, as it were with blaſts, driving it hither and thither, and unequally inkindling it. For as we mentioned before, the ſame moment, in which an object carried from the ſenſe or memory, ſtops at the Imagination, as that Comes under the ſhew of good or evil, it affects the Animal Spirits deſtinated to the Motion of the Precordia, and cauſes the Precordia, by the influx of them, to be variouſly Contracted or dilated, and for that Cauſe it is, that the inordinate motions, and inkindling of the Blood, are ſo performed. But of theſe there will be a more opportune place of treating, when we ſhall ſpeak eſpecially of the Affections of the Soul.

CHAP. VI.

Of the Science or Knowledge of Brutes.

WE have hitherto ſpoken of the Original Nature and manner of the Soul of the Brutes, ſubſiſting in the Body, as alſo of its various degrees or ſpecies, and as it hath in the more perfect Living Creatures Parts or Conſtitutive Members. Further, the *Hypoſtaſis* figure, and dimenſions of the ſame Soul, being rightly delineated, we have Conſidered, how that ſhe is capable of Impreſſions from outward Objects, alſo to what paſſions and alterations beſides ſhe is obnoxious: yet from all this furniture of the Corporeal Soul, and of its powers being put together, it doth not plainly appear, what the ſame is able to do beyond the Virtue or force of any other machine, and to perform by its own proper Virtue or ſtrength. For altho an Impreſſion of an Object driving the Animal ſpirits inwards, and harmonizing them by a certain peculiar manner, cauſes ſenſation; and the ſame ſpirits, for as much as they leap back from within outwardly, as it were by a reflected undulation or waving, ſtir up local motions; yet it is not declared how this Soul, or any part of it, perceives it ſelf to feel, and is driven according to that perception into divers Paſſions and Actions, directed to the Appetite or deſire of this or that Action; and ſometimes, as we have generally obſerved in ſome Beaſts, for the proſecution of the deſired thing doth pick out and chooſe Acts, which ſeem to flow from Council, or a certain Deliberation. In Man indeed it is obvious to be underſtood, that the Rational Soul, as it were preſiding, beholds the Images and Impreſſions repreſented by the ſenſitive Soul, as in a looking Glaſs, and according to the Conceptions and notions drawn from thence, exerciſes the Acts of Reaſon, Judgment, and Will. Yet after what manner in Brutes, Perception, a diſcerning or diſcrimination of Objects, Appetite, Memory, and other ſpecies or Kinds of Inferiour Reaſons as one may ſay, are performed, ſeems very hard to be unfolded; therefore, when ſome could not ſolve this Knot or difficulty, they attributed to Brutes Immaterial Souls, and ſubſiſting after their Bodies. Which if that were true I Know not why Four footed Beaſts ſhould not be indued with reaſoning and underſtanding as well as man, yea and might learn Sciences and Arts; for as much as in either, beſides their immaterial ſouls alike, there is altogether the ſame Conformation of the Animal Organs; upon which indeed it appears, that the Rational Soul whilſt in the Body, hangs or depends as to its acts and habits, becauſe the Organs being hurt, or hindred, a privation or an Eclipſe of theſe ſucceeds: wherefore that the Soul of the Brute uſing the ſame Organs as man, can Know nothing clearly, nor riſe above the Acts and material Objects, it planly follows, that ſhe is different from the Rational Soul and alſo that ſhe is much inferiour and Material.

The Soul of the Brute is ſtrong in ſenſe and motion as a Machine.

But wonderful how by perception.

If the Soul of the Brutes be immaterial, it is alſo rational.

But that it is objected, that all matter whatſoever is not only inſenſible and ſluggiſh, but alſo meerly paſſive, therefore incapable of ſenſe and animal activity, omitting here many inſtances of æquivocal productions, the *Epicureans* affirm to be equally

equally ſtupendious and inexplicable, of which we ſhall diſcourſe anon; we ſhall propoſe as to the former, this one thing, as very Conſentaneous to our *Hypotheſis*; to wit, that there is not much more difference between an inſenſible and a ſenſible Body, than between a thing uninkindled, and a thing kindled; and yet we ordinarily ſee, this to be made from that; why therefore in like manner, may we not judge a ſenſible thing, or Body to be made out of an inſenſible? Every matter, as it is not Burnt, ſo not animated; but being diſpoſed, by either of the active Elements, it behoveth it to be indued with Spirit chiefly, with Sulphur and Salt: Combuſtible things, as Oyl, Roſin, Wood, and the like, of themſelves torpid and ſluggiſh, lye unmoved without fire, heat, or ſome agitation of the parts or particles: But as ſoon as they have taken flame, from ſome incentive being put to it, by and by their Particles being rapidly moved, and as it were animated, produce a ſhining with Heat and Light; and not only make light all about them, but Create innumerable Images, of all things that are ſeated near them, and thickly object them on every ſide: In like manner, the Vital humour in an Egg, remains torpid and ſluggiſh in the beginning, and like to unkindled matter; but as ſoon as it is actuated, from the Soul being raiſed up, preſently like an inkindled fire, it excites Life with Motion and Senſe, and in the more perfect Creatures with heat. Further, the Animal Spirits as Rays of Light, proceeding from this Fire, are Configured according to the Impreſſions of every of their Objects, and what is more, as it were meeting together with reflected irradiations, cauſe divers manner of motions.

A ſenſible thing or Body, is produced from an inſenſible, as an inkindled Body from one not kindled.

Then what is vulgarly delivered, that Matter, out of which Natural things are made, is meerly paſſive, and cannot be moved, unleſs it be moved by another thing, is not true; but rather on the contrary, Atoms, which are the matter of ſublunary things, are ſo very active and ſelf-moving, that they never ſtay long, but ordinarily ſtray out of one ſubject into another; or being ſhut up in the ſame, they cut forth for themſelves Pores and Paſſages, into which they are Expatiated.

That matter is not meerly paſſive.

Yet it may be argued, That if the Soul of the Brute be Compoſed out of theſe, whilſt the ſame is Extended and is Corporeal, it cannot perceive. For it admits the Species of the Object into its whole ſelf, or into ſome part of it ſelf, not the firſt, becauſe then neither the Senſes would be diſtinguiſhed one from another, nor any of them by a perception or common ſenſation of theſe: But if (as indeed it is) it ſhall be ſaid, that all the ſenſible Species being received by appropriated Senſories, to a certain part of the Soul, to wit, the firſt or common Senſory, where they are perceived: Then it may be again objected, That ſo manifold and divers Species or Images of ſenſible things, which at once are Conceived, from Objects, cannot be painted forth in a certain ſmall part of the Brain, but that ſome ſhould obliterate or blot out, or at leaſt Confound others: I ſay none ought to wonder, who hath beheld the Objects of the whole Hemiſphere, admitted thorow an hole into a dark Chamber, and there on a ſudden upon Paper exactly drawn forth, as if done by the Pencil of an Artiſt: Why then, may not alſo the Spirits, even as the Rays of light, frame by a ſwift Configuration, the Images or Forms of things, and exhibit them without any Confuſion or Obſcuring of the Species?

But ſometimes too active.

The common Senſorie is not the whole Soul, but a certain part of it.

This receives all ſpecies without Confuſion.

But yet, tho it be granted, That the Images of ſenſible things are repreſented in a certain part of the Soul, to wit, actuating the Brain it ſelf; to which there happens a moſt ſpeedy Communication, with the whole, and alſo with the ſeveral Parts: however, we are yet to inquire of what Kind of power that is, which ſees and knows ſuch like Images there delineated, and alſo according to thoſe Impreſſions there received, chooſeth Appetites, and the reſpective Acts of the other Faculties.

How this perceives that her ſelf feels or knows.

That we may go on to Philoſophize concerning this matter, I profeſs indeed, whilſt I conſider the Soul and the Body, to wit, either of them by it ſelf and diſtinct, I cannot readily detect, in this, or in that, or in any material ſubject, any thing, to which may be attributed ſuch a Power, with a ſelf-moving energy: But indeed, when I conſider the animated Body, made by an Excellent and truly Divine Workmanſhip, for certain Ends and Uſes, nothing hinders me from ſaying, That it is ſo framed by the Law of Creation, or by the Inſtitution of the moſt Great God, that from the Soul and Body mixed together, the ſame Kind of Confluence of the Faculties doth reſult, by which it is needful for every Animal, to the Ends and Uſes deſtinated to it.

In moſt Mechanical things, or thoſe made by humane Art, the Workmanſhip Excels the matter: who would think there could be an Inſtrument made out of Iron or Braſs, being moſt fixed and ſluggiſh Mettals, whoſe Orbs like to thoſe of the Celeſtial, without any external Mover, ſhould obſerve almoſt continual motions, the Periods of which being renewed at a conſtant turn or change, ſhould certainly ſhew the ſpaces of Time? No Body admires that a rude and ſimple ſound is given by wind, blown into a Pipe; but indeed, by Wind ſent into muſical Organs, and that being carryed variouſly thorow manifold openings of Doors, into theſe or thoſe pipes, that it ſhould create a moſt grate-

As in mechanical things, ſo much more in an animated body the work is more excellent than the matter.

ful Harmony, and Compoſed Meaſures of every Kind; this I ſay deſervedly amazes us, and we acknowledg this Effect, far to Excel both the matter of the Inſtrument, and of the hand of the Muſitian ſtriking it. Further, altho the Muſical Organ very much requires the labour of him playing on it, by whoſe direction, the ſpirit or wind being admitted, now into theſe, anon into thoſe, and into other Pipes, cauſes the manifold harmony, and almoſt infinite Varieties of Tunes; yet ſometimes I have ſeen ſuch an Inſtrument ſo prepared, that without any Muſitian directing, the little doors being ſhut up, by a certain law and order, by the mere Courſe of a Water, almoſt the ſame harmony is made, and the ſame tunes, equal with thoſe Compoſed by Art. And indeed Man, ſeems like to the former, in which the rational Soul, ſuſtains the part of the Muſitian playing on it, which governing and directing the animal ſpirits, diſpoſes and orders at its pleaſure, the Faculties of the Inferior Soul: But the Soul of the Brute, being ſcarce moderatrix of its ſelf, or of its Faculties, Inſtitutes, for Ends neceſſary for it ſelf, many ſeries of Actions, but thoſe (as it were tunes of harmony produced by a water Organ, of another Kind) regularly preſcribed by a certain Rule or Law, and almoſt always determinated to the ſame thing.

A ſelf moving muſical Organ.

To which the ſoul of the Brute is like.

This indeed holds good, concerning the more imperfect Brutes, in whoſe Souls or Natures are inſcribed the types or ways of the Actions to be performed by them, which they rarely or never tranſgreſs or go beyond; and that according to the vulgar ſaying in the Schools, *They do not ſo much act, as are acted*: yet in ſome more perfect Brutes, whoſe Actions are ordained to many and more noble Uſes, there are far more Original Types, and to their Souls there ought to be attributed a certain faculty of Varying their Types, and of Compoſing them in themſelves; for the Brutal Soul it ſelf, being ſo gifted naturally, as ſhe is Knowing and Active, concerning ſome things neceſſary for it; ſhe is taught through Various Accidents, by which ſhe is wont to be daily affected, to know afterwards other things, and to perform many other, and more intricate Actions: But how all this may be done, (without calling an immaterial Soul into play) to wit, by what helps, whether innate or adventitious, or acquired, the Science of the Brutes is gotten or polliſh'd, will be worth our Labour to ſhew a little more fully: that it may appear at length, what is the utmoſt thing that living Brutes can know or do, and how far that is below the power of the Rational Soul.

The more perfect Brutes are indued with knowledge.

Therefore, that we may ſeek out as it were the ſeveral footſteps, by which all brute Animals are imbued with the Knowledg of things; we ought firſt to diſtinguiſh here, that ſome of their Knowledg is born with them, as we but now hinted, to wit, for ſome Uſes needful for the lengthning of Life, being infuſed by the moſt high Creator, and impreſſed like a Character, from their firſt formation, on the beginnings, or on their very Natures themſelves, which is wont commonly to be called *Natural Inſtinct*: But others acquired, to wit, which by degrees is learned, by the incurſion of ſenſible things, Imitation, humane Inſtitution, and other ways, and is carryed to a greater degree of Perfection in ſome than in others; yet in ſome, this acquired Knowledg, as alſo Cuning, depend wholly on the natural Inſtinct, and being poliſhed by frequent uſe and habit, and Carried a little further, ſeem to be certain additions only.

That is either inbred.

Or acquired.

Firſt, As to what regards natural Inſtincts, it is a great and moſt ancient Notion, That there is in all Living Creatures, an innate Conſervation of themſelves, to wit, that every Individual might preſerve it ſelf as long as it can: This is a Law of Divine Providence, inbred in all Creatures, which gathers together the Principles of Life like a Bond, otherways apt to be diſſipated and to depart one from another, and on which, as the Baſis, the Duration or Continuance of the whole World ſtands.

What natural inſtinct is.

This being ſuppoſed, it neceſſarily follows, that all Animals ordained for this end, are furniſhed alſo with certain fit means, for following the ſame, wherefore they ought to know by Natural Inſtinct, whatſoever things are Congruous and benign, and what are incongruous or hurtful to them, and that they ſhould follow theſe with hatred and averſion; and thoſe with Love and delight. Hence it is, that every one of them are able to chooſe Food proper for themſelves, and to ſeek it being abſent, and remote from their Eyes; And from an implanted diſpoſition of their Nature, are skilful to know and oppoſe Enemies, to love their Friends, to get a female fit for themſelves, and to make ready whatever may conduce to the Procreating and Cheriſhing their Young; beſides many other Kinds of powers and habits, granted to us not without Learning and Study, are originally fixed on the *Præcordia* of the Beaſt.

What it brings to the Brutes.

And truly, if we look upon the Ingenuity and Proprieties of all Animals, we ſhall find theſe Kind of Effects after a manner in all: For many of them are no ſooner brought to light, but they ſeek and greedily embrace remedies againſt hunger and Cold, without any guide or ſhower; then being ſomewhat grown up, tho Carefully Kept from all their Companions, yet without any one to ſhew them, or any example, they

Some examples and inſtances of it.

they of their own accord perform the peculiar Actions of their Kind. A Lamb just brought forth, and scarcely out of the after-birth, presently snatches at and sucks the Duggs of its Dam. A Chicken, as soon as out of the shell, will pick up grains of Corn, hides it self under the wings of the Hen, and flyes from the approach of the Kite. Cattel feeding in the Pastures, are more Skilful than Men, about the Virtues of Herbs; for they easily discern at the first tast, what are for food; what for Medicine, yea, what is to be shun'd, being imbued with poyson and death; when we in the mean time, unless taught by experience, are wholy ignorant of their Virtues or poysonous force: so that *Pliny* Complained, that it was a shame, that all Animals Knew what was healthful for themselves, besides Man.

Natural Instinct dictates to Brutes, what is wholesome and what unwholesome.

Neither does what some object otherways determinate this matter, that the means of these Kind of effects, depend only upon the similitude or the dissimilitude of Patricles, which are in the sensible and the Sensory, without any intention of the Beasts, or End of their Acting; because we have observed, that Brute living Creatures, by the Virtue of natural Instinct, perform not only simple actions, stirred up by one Impression of the External agent, as when the heat of the Sun invites to take the Cool of that shade, but they perform and do manifold works, and Continued by a long Series. Birds by reason of the Influence of the Spring, being instigated to the begetting others apply themselves to that business, without any other provoker or director, as it were Consultingly and premeditated; for they enter into wedlock, as it were by a solemn manner of Espousals, they choose a fit place for the building their nest or habitation, where they make it most artificially beyond the skill of humane Architecture; then they lay Eggs, and by sitting on them bring forth young ones, and then carefully nourish them with food which they get for them. We might here also take notice of the most admirable Republiques of Bees and Ants, in which, without any written Laws or promulged Right, the most perfect ways of Government are exercised. But as in all these without any Variety, one thing is always and wholy after the same manner administred, it is a sign, that these Kind of principles or beginnings of the Brutes, are nor stirred up either by external objects, whose Impulse is still various and divers, nor from an internal proposition of the Mind, which is more mutable than the wind; But excited from a more fixed and Certain principle, determinate always to one thing, which can be only Natural Instincts: The World is full of Examples of this sort, which testifie the native indowments and implanted Ingeny of Brutes: For in all Animals, there are by Nature a Certain Ingeny and habit born with them, by which they are instigated through a secret impulse and blind power to the performing of Actions, which respect both the Conservation of themselves, and the propagation of their Kind; and these Gifts being originally granted, constitute as it were the first lineaments or groundwork of practical Knowledge, with which the Soul of Brutes are wont to be imbued: then an acquired Cognition being superadded to those rudiments, fills up the vacuities of those things drawn forth, and adds a perfection to the former foundation.

Leads not only to simple Actions but also to very Complicate Actions.

But yet those always, and in all, of one Kind only.

For Secondly, besides the natural Instincts, living Brutes are wont to be taught by sensible species, to wit, to profit in the Knowledge of several things, and to acquire certain habits of practice: But this happens not equally to all nor at all times. For in many Animals newly brought forth, natural Instinct is of some force, but then the Impressions of sensible things little or nothing affect the sensitive soul: Because, altho the flamy part of the Soul is enough inkindled in the Brain, yet because the Brain and its Appendix, abounds with much humidity, therefore the Spirituous Effluvias, or the lucid part of the Soul which ought to irradiate these Bodies, is very much obscured, as the beam of the Sun passing thorow a thick Cloud: Wherefore at this time, the strokes of sensible things, being not deeply fixed, are presently obliterated, and in them local motions hardly follow: yea in some Beasts, in whom the Blood being continually and habitually thick, and who have a less Clear Brain, tho through their whole Life some acts of the Exterior Senses and Motions are performed, yet few Characters are left, of any interiour Knowledg. Wherefore, we shall here inquire only concerning Brutes, that are more docil, to wit, in whom are besides local motions, and the five Exterior Senses, Memory, and Imagination; and in these we may conceive this kind of Introduction, or Method of Institution, concerning the Exquisite Knowledge, by the sense with which they are wont to be imbued.

2. *Brutes, in some things, are taught by the Impressions of sensible things.*

Therefore, as soon as the Brain in the more pefect Brutes grows Clear, and the Constitution of the Animal Spirits becomes sufficiently lucid and defecated, the exterior Objects being brought to the Organs of the Senses, make Impressions, which being from thence transmitted, for the continuing the Series or Order of the Animal Spirits inwards, towards the streaked Bodies, affect the Common Sensory; and when as a sensible Impulse of the same, like a waving of Waters, is carried further into the Callous Body,

The direct sensible Species creates in them the Phantasie and the Memory.

The reflected Appetite.

and thence into the *Cortex* or ſhelly ſubſtance of the Brain, a Perception is brought in, concerning the Species of the thing admitted, by the Senſe, to which preſently ſucceeds the Imagination, and marks or prints of its Type being left, conſtitutes the Memory; But in the mean time, whilſt the ſenſible Impreſſion being brought to the common Senſory, effects there the Perception of the thing felt; as ſome direct Species of it, tending further creates the Imagination and Memory; ſo other reflected Species of the ſame Object, as they appear either Congruous or Incongruous, produce the Appetite, and local motions its Executors; that is, the Animal Spirits looking inwards, for the Act of Senſion, being ſtruck back, leap towards the ſtreaked Bodies; and when as theſe Spirits preſently poſſeſſing the Beginnings of the Nerves, irritate others, they make a deſire of flying from the thing felt, and a motion of this or that member or part, to be ſtirred up: Then, becauſe this Kind, or that Kind of Motion ſucceeds once or twice, to this or to that Senſion, afterwards, for the moſt part, this Motion follows that Senſion as the Effect follows the Cauſe: and according to this manner, by the admitting the Idea's of ſenſible things, both the Knowledg of ſeveral things, and the habits of things to be done, or of local Motions, are by little and little produced: For indeed, from the beginning, almoſt every Motion of the animated Body is ſtirred up by the Contact of the outward Object; to wit, the Animal Spirits reſiding within the Organ, are driven inward, being ſtrucken by the Object, and ſo (as we have ſaid) conſtitute Senſion or Feeling; then, like as a Flood ſliding along the Banks of the ſhore, is at laſt beaten back, ſo, becauſe this waving or inward turning down of the Animal Spirits, being partly reflected from the Common Senſory, is at laſt directed outwards, and is partly ſtretched forth even into the inmoſt part of the Brain, preſently local Motion ſucceeds the Senſion; and at the ſame time, a Character being affixed on the Brain, by the ſenſe of the thing perceived, it impreſſes there, Marks or *Veſtigia* of the ſame, for the Phantaſie and the Memory then affected, and afterwards to be affected; but afterwards, when as the Prints or Marks of very many Acts of this Kind of Senſation and Imagination, as ſo many Tracts or Ways, are ingraven in the Brain, the Animal Spirits, oftentimes of their own accord, without any other forewarning, and without the preſence of an Exterior Object, being ſtirred up into Motion, for as much, as the Fall into the footſteps before made, repreſent the Image of the former thing; with which, when the Appetite is affected, it deſiring the thing objected to the Imagination, cauſes ſpontaneous Actions, and as it were drawn forth from an inward Principle. As for Examples ſake, The Stomach of an Horſe, feeding in a barren Ground or fallow Land, being incited by hunger, ſtirs up and variouſly agitates the Animal Spirits flowing within the Brain; the Spirits being thus moved by accident, becauſe they run into the footſteps formerly made, they call to mind the former more plentiful Paſture fed on by the Horſe, and the Meadows at a great diſtance, then the Imagination of this deſirable thing, (which then is caſt before it, by no outward Senſe, but only from the Memory,) ſtops at the Appetite: that is, the Spirits implanted in the ſtreaked Bodies, are affected by that Motion of the ſpirits flowing within the middle part or Marrow of the Brain; who from thence preſently after their former accuſtomed manner, enter the origines of the Nerves, and actuating the Nervous Syſtem after their wonted manner by the ſame Series, produce local Motions, by which the hungry Horſe is carried from place to place, till he has found out the Imagined Paſture, and indeed enjoyes that good the Image of which was painted in his Brain.

The Appetite ſtirs up local Motion.

Which being often ſtirred up produce an habit of Acting.

After this manner, the ſenſible Species being intromitted, by the benefit of the Exterior Organs, in the more perfect Brutes, for that they affix their Characters on the Brain, and there leave them, they conſtitute the Faculties of Phantaſie and Memory, as it were Store-houſes full of Notions; further, ſtirring up the Appetite into local Motions, agreeable to the Senſions frequently, they produce an habit of Acting; ſo that ſome Beaſts being Taught or Inſtructed for a long time, by the aſſiduous Incurſion of the Objects, are able to know and remember many things, and further learn manifold works; to wit, to perform them by a Complicated and Continued ſeries and ſucceſſion of very many Actions. Moreover, this Kind of acquired Knowledg of the Brutes, and the Practical habits introduced through the Acts of the Senſes, are wont to be promoted by ſome other means, to a greater degree of perfection.

3. *Brutes are alſo taught by experience.*

For in the third place, it happens to theſe by often Experience that the Beaſts are not only made more certain of ſimple things, but it teaches them to form certain Propoſitions, and from thence to draw certain Concluſions. Becauſe, draught Beaſts, having ſometimes found water to be Cooling, they ſeek it far as a remedy of too much heat; wherefore, when their Precordia grow hot, running to the River they drink of it, and if they are hot in their whole Body they fearleſly lye down in the ſame. In truth, many Actions which appear admirable in Brutes

came

came to them at first by some accident, which being often repeated by Experience, pass into Habits, which seem to shew very much of Cunning and Sagacity; because, the sensitive soul is easily accustomed to every Institution or Performance, and its Actions begun by Chance, and often repeated, pass into a Manner and Custom. So it happens sometimes by Chance, among Hounds, that one had caught the prey, not exactly but by following a Shorter way; this Dog afterwards, as if he were much more Cunning than the rest, leaves the Hare making her turnings and windings, and runs directly to meet her another way.

4. By Example, Imitation, and Institution also

Living Brutes are taught by Example, by the Imitation and Institution of others of the same or of a divers Kind, to perform certain more excellent Actions. Hence it is that the Ape so plainly imitates Man, that by some, it is thought a more imperfect Species of him. For this Animal being extreamly mimical, as it is indued with a most Capacious and hot Brain, it imitates to an hair, almost all the Gestures that it happens to see, presently with a ready and expeditious Composing of its Members, and is furnished with a notable Memory, and retains all its tricks which it has once acted very firmly afterwards, and is wont to repeat them at its pleasure. They are very admirable habits, which Horses, Doggs, and Birds get, being carefully instructed by the Discipline of Man; and not only from Men but being taught first by their Companions, they imbibe altogether new and more Excellent Customs: so one Dog ordinarily teaches another to hunt, and one Bird another to compose harmonious notes and various tunes. It were an Easy matter to bring very many Instances of this Kind. But we shall hasten to other things.

How far it is that Brutes are able to Know.

Having thus enumerated the Chief Helps from Nature and Art, by which living Brutes do profit in the Knowledg of things, and are instructed by the Habits of Acting, we shall now inquire, to what hight most of them or all of them put together, can arrive.

First, from what we have said 'tis clear, that Living Brutes are directed to all things which belong to the Defence and Conservation of the Individuum, and that are to be done for the propagation of their Kind, by a natural Instinct, as it were a Law or Rule fixed in their Hearts: when as therefore we behold for these ends, ordained by Divine Providence, Brutes to order their matters wisely, and as it were by Council, no man Esteems this the work of Reason, or of any liberal faculty; yea they are led into these enterprises, by a certain Prædestination, rather than by any proper Virtue or Intention.

How natural Instinct is wont to be Compated with acquired Notions.

Secondly, The Natural Instinct of Brutes, happens, not rarely, with notions acquired by the sense, and being Complicated with them conduces to the Propositions or Assumptions to be done, Concerning many things, and the Deductions to be drawn from thence. A Dog being by a staff struck, or by the flinging of a stone, perceives the hurt received by the senses, and easily retains the Idea in his Memory, but the Instinct dictates to him that the like stroke may be shunned afterwards, wherefore, when he sees a staff held out before his eyes, or a stone taken up, fearing thence the like hurt, he hastily flies away.

With the Impressions of sensible things.

With Habits learnt from Example or Institution.

Thirdly, sometimes Instincts, and also all other acquired Knowledges, are mixed together, either with the Example of Habits, or with the general Institution of things learnt: And when as notions so arising from one faculty or power, answer to Actions drawn from another, from thence is produced a certain Kind of Discourse or Ratiocination, and often-times it is continued by a certain Series or Thrid of Argumentation. Many admirable Histories are reported, concerning the Subtilties and Craft of the Fox, which he is wont to perform for the getting of his living. This Creature, that he might allure the Hens within the Compass of his Chain, with which he was tyed, lying all along, his legs stretched forth, feigns as if he were dead, then they coming near him, he readily leaps upon them. Moreover, I have heard it told, that a wild Fox, that he might get into his clutches a Turkie Cock roosting in a Tree, running round the Body of the Tree, with a swift Motion, continually beheld the Bird with an intentive Eye, by which Means, as the Turkie still followed the Fox thus running Round with his eye, carrying his head about till being infected with a giddiness, he fell down from the top of the Tree, into the mouth of his Enemy: I say, it was natural to the Fox, that he should desire domestick Fowl, as his prey; but that he should frame these Kind of Snares for them, this he must have by former acquired Knowledges, from Sence, Experience, and Imitation, and complicated with natural Instinct. It is very likely that the Fox had learnt by former Experience, that the Hens did not fear him lying as dead, which might happen by Chance, when being wearied, or to sleep, he had lay'd himself on the ground: In like manner, perhaps, when he had run about the Tree, seeking some way to get up into it, the Prey might fall down into his mouth; Wherefore afterwards when he would take his prey, he repeated the Series of the same Actions; because, what he

With notions learnt from Experience and Imitation.

he had known to be done before, he presumed might be done again. In both Cases, and in others like them, the reason of the whole thing done, or the Endeavour, is resolved into these Propositions; The Fox thinking, now to take the Prey, that is before his eyes, after what manner he may, remembers how he had taken the same formerly, by these or those sort of Cunning ways or Crafts, found out by some chance; These are the Premises, the former of which is suggested from Nature, and the second from Sense and Experience, from whence a Conclusion follows, Therefore Foxes for the taking of their Prey, use again the same Wiles. According to this sort of *Analyzing*, the most Intricate Actions of Brutes, which seem to contain Ratiocination, may be explained, and reduced into Competent notions of the sensitive Soul.

The Syllogisms of Beasts.

CHAP. VII.

The Corporeal Soul, or that of the Brutes, is Compared with the Rational Soul.

FRom what we have said is to be understood, how much it is that Brute Animals are wont to do with the whole furniture of the Corporeal Soul, and to obtain towards the use of Reason: But now we shall endeavour to shew, how far they are below it, and how much less they are able to do than Man, endued with a Rational Soul. The means of observing the difference between these Souls are commonly to be had, being noted by divers Authors both Ancient and Modern and both Philosophers and Theologists, till it is almost worn thread-bare, yet we will take leave to shew you only some few select things, which for Methods sake, we shall reduce to these three Heads: viz. 1st. It is shown, That man using expeditiously and freely the Powers of the Superiour Soul, of the Intellect, Judgment, Discourse, and other Acts of Reason, shews them far excelling any Faculty or Science of the Brute, and the whole power of the Corporeal Soul. 2. By what Knitting the Corporeal Soul, and the Rational are joyned together, in the Humane Body, by what means they agree in the same habitation; also what offices they perform each. 3. Shall be declared, for what means, and for what occasions these Souls differ among themselves, yea sometimes are wont to dissent and move more than Civil Wars.

Three heads of this Discourse viz. 1. *It is shown that the Rational Soul far excels the Brutal.*

2. *How both Souls are joyned in Man, and*

3. *How they frequently disagree among themselves.*

The eminency of the Rational Soul above the Brutal or Corporeal, shines clearly by comparing either, both as to the Objects, and to the chief Acts or Modes of Knowing. As to the former, when as every Corporeal Faculty is limited to sensible things, and every one of these to certain Kinds of things, the object of the humane Mind is every Ens, whether it be above, or sublunary, or below the Moon, Material or Immaterial, true or fictitious, real or Intentional; wherefore *Aristotle*, who seemed to hesitate something about the Nature of the Rational Soul, hinting its acting Intellect as if it were Immaterial and Immortal, doth pronounce it not only separable and without Passion, but also unmixt because it understands all things. *Lib. de Animâ* 3. *Cap.* 4.

The Priority of the Rational Soul as to

1. *The Objects which are Every Ens.*

Secondly, The Acts or degrees of Knowledg, Common to either Soul, are Vulgarly accounted these three. To wit, simple Apprehension, Enunciation, and Discourse; how much the Power of the Rational, excells the other Corporeal in each, we shall consider:

2. *The Acts of Knowing.*

The first Act of either Soul is simple Apprehension.

The power of this in Brutes is Phantasie or Imagination.

Which is often deceived.

First, The Knowing Faculty of the Corporeal Soul is Phantasie or Imagination, which being planted in the middle part of the Brain, receives the Sensible Species, first only impressed on the Organs of sense, and from thence by a most quick Irradiation of the spirits delivered inwards, and so apprehends all the several corporeal things, according to their Exterior Appearances; which notwithstanding, as they are perceived only by the sense (which is often deceived) they are admitted under an appearing, and not always under a true Image or Species. For so we Imagine the Sun no bigger than a Bushel, the Horizon of the Heaven and the Sea to meet, and then the Stars not to be far distant from us in the Horizon, and that in respect of us, there are no Antipodes; further we may think the Image in the Glass, or in a Fountain delineates it self, that the Eccho it self is a Voyce coming from some other place, that the shore moves being on the water, yea and many other things, being received by the Sensories, whilst Phantasie is the only guide seem far otherways than indeed they are: But indeed, the Intellect presiding or'e the Imagination, beholds all the Species deposited in it self, discerns and

In man it is the Intellect presiding or'e the Imagination.

corrects

corrects their obliquities or hypocrisies the Phantasie there drawn forth sublimes, and divesting it from matter formes universal things from singulars; moreover, it frames out of these some other more sublime Thoughts, not Competent for the Corporeal Soul: so it speculates or Considers both the nature of every substance, and abstracted from the Individuals of Accident, viz: Humanity, Ratiotinality, Temperance, Fortitude, Corporeity, Spirituallity, Whiteness, and the like; besides, being carried higher, it Contemplates God, Angels, It self, Infinity, Eternity, and many other notions, far remote from Sense and Imagination. And so as our Intellect, in these kind of Metaphysical Conceptions, makes things almost wholly naked of matter, or carrying it self beyond every sensible Species, consider or beholds them wholly immaterial, this argues certainly, that the Substance or Nature of the Rational Soul is Immaterial and Immortal: Because, if this Aptness or Disposition were Corporeal, as it can conceive nothing Incorporeal by Sence, it should suspect there were no such thing in the World.

Which discerns the errors of this.

Sublimates its notions, & divests them from Matter.

Contemplates immaterial Substances.

Secondly, It appears clearly, from what was said before, that Phantasie, or the Knowing facultie of the Corporeal Soul, doth not only apprehend simple things, but also Compose or Divide many things at once, and from thence to make enuntiations: Because living Brutes, in various objects together, which are for food, discern things Convenient from others Inconvenient or unfit; moreover, they choose out of these, things grateful before others less grateful, and get them sometimes by Force, sometimes by Cunning, and as it were by stealth. A Dog knows a Man at a great distance; if he be a Friend, he runs to him and fawns on him; If an Enemy and fearful, he barks at him or flies at him, but if armed or threatning him, he flyes away from him. These kind of Propositions the Brutes easily conceive, for as much as some Species of the sensible thing being newly admitted, meets with Species of one thing or other before laid up in the memory, or being suggested by a Natural Instinct, associates with them or repulses them. But indeed, how little is this, in respect of the humane Intellect? which not only beholds all enunciations conceived by the phantasie, but judges them, whether they be true or false, Congruous or Incongruous; orders and disposes them into Series of Notions, accommodated to speculation or practise: Moreover, it restrains the phantasie it self, being too instable and apt to wander through various phantasies; it calls it away from these or those Conceptions, and directs it to others, yea it keeps it within certain limits at its pleasure, lest it Should expatiate or divert too much from the thing proposed: Which out of doubt is a sign that there is a Superior Soul in Man, that moderates and governs all the faculties and Acts of the Corporeal. But the Intellect, not only eminently Contains every Virtue of the phantasie; but from the Species perceived in it, deduces many other thoughts altogether unknown to the sense, and which the Phantasie of it self could no way Imagine. For Besides, that it conceives the formal notions of Corporeal things, abstracted from all matter, and attributes to them prædicates meerly Intentional yea and understands axioms or first principles alone, and as it were by a proper Instinct, without recourse to Corporeal Species; the humane mind also beholds it self, by a reflected Action, it supposes it self to think, and thence Knowing a proper existency, not to be perceived neither by Sense nor by Phantasie; when in the mean time, neither Sense nor Imagination (of which no Images are extant) do perceive it self to know or imagine: Besides these, the Rational Soul comprehends, as it were by its own proper light, God to be Infinite and Eternal, that he ought to be Worshipped, that Angels or Spirits do inhabit the World, Heaven, and places beneath the Earth, that there are places of Beatitude, and Punishment, and many other notions meerly Spiritual, by no means to be learnt from Sense or Phantasie.

The Second Act of either Soul is Enunciation.

What and how slender this is in Brutes.

The rational judges, discerns, and directs the propositions of the Phantasie.

It deduces from these others more sublime thoughts.

It beholds it self by a reflected Action.

And Contemplates other things remote from sense, as God &c.

3. The perogatives of the Rational Soul, and the differences from the other Sensitive or Corporeal, may be yet further noted, by Comparing the Acts of Judgment and Discourse, or Ratiocination, which it puts forth more perfectly, and often time demonstratively, when these Kind of Acts, from this power in the Brutes, are drawn forth imperfectly, and only analogically, we have already declared the utmost that Brutes can do, and how far they can go towards the exercise of Reasoning and Deliberation, through innate faculties, and acquired habits; which truly, if the whole be compared with the functions of the humane Intellect, and its Scientifick Habits, it will hardly seem greater than the drop of a Bucket, to the Sea. For to say nothing of that natural Logick, by which any one endoued with a free and perspicacious mind, probably and sometimes most certainly concludes, Concerning all doubtfull things, or things sought after, if that we mind how much the humane mind being adorned by Learning, and having learnt the Sciences and liberal Arts, is able to work, uuderstand, and search out; it would be thought, tho in an Humane Body, to be rather living with Gods or Angels. For indeed here may be Considered, the whole *Encyclopædia* or Circle of Arts and Sciences, which (excepting

The Ratiocination of the Brute, what and how vile.

The humane Mind immensly more excellent.

Is imbued with a natural Logick.

It hath Created all Arts & Sciences (except Theologie)

excepting Divinity) hath been the Product or Creature of the Humane Mind, and indeed argues the Workman if not divine, at leaſt to be a particle of Divine Breath, to wit, a Spiritual Subſtance, wonderfully Intelligent, Immaterial, and which therefore for the future is Immortal. It would be tedious here to rehearſe the Subtil Wiles of Logick, and the extremely curious web of Notions, or of the Reaſon of Eſſences, or Beings, where the things of Natural Philoſophy being unfolded by their Cauſes, are diſſected as it were to the Life; the moſt pleaſant Speculations, the profound Theorems or rather Celeſtial, of the *Metaphyſicks* or ſupernatural things; yea and the grand Myſteries of other learning firſt found out by humane Induſtry. But above the reſt, is it not truly amazing to ſee the moſt certain Demonſtrations of the Mathematicks, and therefore a-Kin and greatly alluding to the Humane Mind, its Problems and Riddles how difficult ſoever to be extricated, with no labour, yea and many things of it attained, and moſt glorious Inventions. What is it below a Prodigy, that *Algebra* from one Number or Dimenſion, which at firſt was uncertain and unknown, being placed, ſhould find out the quantity of another altogether unknown? What ſhall I ſay concerning the Proportions of a Circle, a Triangle, a Quadrangle, and other Figures, and of their Sides or Angles variously meaſurable among themſelves, being moſt exactly computed? what beſides, that the Humane Intellect having learnt the Precepts of *Geometrie* and *Aſtronomie*, takes the ſpaces of inacceſſible places, and their heights, the floor or breadth of any ſuperficies, and the contents of ſolids, yea the dimenſions of the whole Earthly Globe: meaſures exactly the ſpaces of hours and days, the times of the year, the Tropicks, by the progreſs only of a ſhadow? yea it meaſures the Orbs, Magnitudes, and Diſtances of the Sun and Starrs, for a long time to come, Calculates, and exactly Foretells, their riſings and ſettings, motions, declinations, and Aſpects one to another; we ſhould want time, ſhould we go about to enumerate the ſeveral portentous things, either of the practice or ſpeculation in the Mathematicks. Then, if paſſing over to Mechanical things, We ſhall conſider the ſeveral Works and Inventions of Workmen, and the artificial Smiths-Works wonderfully made, there will be no place for doubting, but that the humane Soul, which can ſo famouſly underſtand, invent, and find out, and effect, I had almoſt ſaid, Create things ſo ſtupendious, muſt needs be far above the Brutal, Immaterial and Immortal; eſpecially becauſe Living Brutes obtain only a few and more ſimple Notions and Intentions of Acting, yea and thoſe always of the ſame Kind, and not determinated but to one Thing, altogether ignorant of the Cauſes of things, and know not Rights or Laws of political Society: further, they make no Fires or Houſes, nor find out any mechanical Arts, they put not on cloaths, nor dreſs their food, yea unleſs taught by Imitation, they know not how to number Three. When therefore we have plainly detected in Man, beſides the Corporeal Soul, ſuch as is Common with Brutes, the prints of another ſuperiour, meerly ſpiritual, we ſhall next ſeek out by what bond, and by what neceſſitude, theſe twins are conjoyned, and intimately come together, in the ſame Body.

Logick.

Phyſick.

Metaphyſicks.

Mathematicks.

Algebra.

Admirable things of Geometry and Aſtronomy.

The humane Mind does wonders in mechanical Things.

In reſpect of Man, how little is it that the Soul of a Brute Can do?

Some of thoſe, who have ſhew'd the difference, between the Souls of the Brute and of Man, affirming the Irrational or Corporeal peculiar to them, would have the Rational Soul of Man, to perform not only the Offices of the Intellect and Diſcourſe, but alſo the other Offices of Senſe and Life, yea to do and adminiſter the whole Oeconomy of Nature: To which opinion (however it may have prevailed in our Schools) the opinions of moſt learned men of every Age has been clearly oppoſite. That I may not be tedious, in rehearſing of many, I ſhall cite only two Authors (but either of which is worth a Multitude) in the Confutation of this Aſſertion. One is, that famous Philoſopher, *Peter Gaſſendus*, who *Phyſic. Sect.* 3. *lib.* 9. *Cap.* 11. differencing the Mind of Man, as much as he could, from that other Senſitive Power of his, by many and very remarquable notes of diſcrimination, yea (as 'tis ſaid in the Schools) by Specifick Differences, he has (as they ſay) divided the whole Heaven between: Becauſe when he had ſhewed this to be Corporeal, Extenſive, and alſo Naſcible or that may be born, and Corruptible, he ſaith that the other was an Incorporeal Subſtance, and therefore Immortal, which is Created mediately by God, and infuſed into the Body; which opinion he ſhews *Pythagoras*, *Plato*, *Ariſtotle*, and many ancient Philoſophers, beſides *Epicurus*, very much to have favoured; excepting however, that they, for as much as they not knowing the beginning of the Soul they judged Immortal, affirmed it, taken from the Soul of the world, to ſlide into the humane Body, and it to be refunded again either immediately into that Soul of the World, or mediately at length, after a Tranſmigration thorow other Bodies. The other ſuffrage concerning this matter is, of the moſt Learned Divine, our *Dr Hammond*, who unfolding that Text of St *Paul* to the *Theſſalonians*, 1 chap. 5. v. 23. *The whole Body Soul and Spirit*: ſays, that man is divided into three parts, to wit, Firſt into the body, which is the Fleſh and Members:

That there are two diſtinct Souls in Man beſides many other of later Time there are for Authors

Gaſſendus

And Hammond.

Secondly

Secondly, Into an Animal Life, which also being Animal and Sensitive, is common to Man with the Brutes; And Thirdly, into Spirit, by which is signified the rational Soul, at first Created by God, which being also Immortal, returns to God, *Lib. Annot.* on the New Testament, *p.* 711. He Confirms this his Exposition, by Testimonies taken from Ethnick Authors, also from the Fathers. And truly it is most evidently plain, from what hath been said, That Man is made, as it were an Amphibious Animal, or of a middle Nature and Order, between Angels and Brutes, and doth Communicate with both, with these by the Corporeal Soul, from the Vital Blood, and heap of Animal Spirits, and with those by an intelligent, immaterial, and immortal Soul. And indeed, Reason persuades us plainly that 'tis so, to wit, for as much as we find in our selves, as by and by shall be more fully shown, the Strifes and Dissentions of one Soul with another, sometimes this, and sometimes that getting the Rule, or being in Subjection. But as it is said, That the Rational Soul doth exercise of it self all the Animal Faculties, is most improbable; because the Acts and Passions of all the Senses, and Animal Motions are Corporeal, being divided and extended to various Parts; to the performing which immediately, the incorporeal and indivisible Soul seems unable, so that it would be finite. Then as to what respects that Vulgar Opinion, that *the Sensitive Soul is subordinate to the Rational, and is as it were swallow'd up of it*, as that which in Brutes is the Soul, is mere Power in Man; these are trifles of the Schools. For how should the Sensitive Soul of Man, which subsisting at first in Act, was material and extended, foregoing its Essence at the coming of the Rational Soul, degenerate into a mere Quality? if that it should be asserted, That the Rational Soul by its coming, doth introduce also Life and Sensation, then Man doth not generate an animated Man, but only an inform Body, or a rude lump of Flesh.

This also Reason dictates.

The Rational Soul does not exercise the Animal Faculties.

Obliterates not the Sensitive Soul by its Coming.

Nor transmutes it into a mere Power.

Therefore, supposing that the Rational Soul, doth come to the Body first animated by another Corporeal Soul, we shall inquire, by what Bond or Knitting, since it is pure Spirit, it can be united to it, for as much as it hath not Parts, by which it might be gathered to, or cohere with this whole, or any of its Parts. Concerning this, I think we may say, with the most Learned *Gassendus*, That the *Corporeal Soul is the immediate Subject of the Rational Soul, of which, as she is the Act, Perfection, Complement, and Form by her self, the Rational Soul also effects the Form, and Acts of the humane Body.* But for as much, as it seems not equal nor necessary, that the whole Corporeal Soul, should be employed by the whole Rational; therefore we may affirm, this purely Spiritual, to sit as in its Throne, in the principal Part or Faculty of it, to wit, in the Imagination, made out of an handful of Animal Spirits, most highly subtil, and seated in the Middle or Marrowie part of the Brain: Because, when as the Species, or every sensible Impression, of which we are any ways Knowing, being inflicted any where on the Humane Body, is carried to the Imagination or Phantasie, and there all the Appetites or Spontaneous Conceptions, or Intentions of things to be done, are excited, the Intellect or Humane Mind, presiding in this Imperial seat, easily performs the Government of the whole Man. For (as *Gassendus* properly has it) *As there is no necessity for a King, to be in his whole Kingdom, but only in his Palace, to which place, are carried whatever happens in the Kingdom; so the Phantasie is the Kingly Palace of the Intellect, to which may be brought whatsoever are acted Spontaneously and to our Knowledge, in the whole Body.* But as to what has relation to the Functions merely Natural, which being done by a constant manner of Oeconomy, as it were by a Law from the Creator, are performed unknown to the Animal, it were not fit, that the Imagination, much less the Intellect, should attend on these lower Offices: altho also, the faults of these, as often as they are amiss, lying hid to the Imagination, the Intellect most often finds them out, and procures them to be amended. As to the Mode of the Intellect, by which the Phantasms of all sensible Things being drawn in the Imagination, is beheld, it may be said, That this is done not by perculsion from the Corporeal Species, (for this is repugnant to the Corporeal Faculty) but by an Intuition into it self, expressed in the Phantasie. But as the Rational Soul, will stay and preside in the Court of the Phantasie, there is no need that she should be shut out from thence, or bound by any Bond; because destinated to this by the most high Creator, to wit, that it should be *the informing Form of Man*; and also her self is very much inclined, to the Inhabiting this House; because, whil'st in the Body, it depends very much, as to its Operation, on the Phantasie, without the help of which, it can know or understand nothing. For it draws its first Species and fundamental Idæa's, by which it rears all its manner of Knowledge, from the Imagination; wherefore, that the Mind of one Man understands more, and reasoneth better, than that of another, it does not thence follow, that Rational Souls are inequal, but every disparity, concerning the Intellect, proceeds immediately from the Phantasie, but mediately and principally from the Brain, being variously disposed. For as this being affected, by an

By what Bond the Rational Soul is united to the Body.

That the Corporeal Soul is the Subject of the Rational. Gass. Physic. Sect. 3. Memb. Post. l. 9. c. 11.

Gassend. Ibid.

The Seat or Palace of the Humane Mind, is in the Phantasie.

The manner by which the Phantasms are beheld by the Intellect, viz. Intuition, not Perculsion.

The Rational Soul is inclined to the Body.

The Intellect depends upon the Phantasie.

By reason of the various Constitution of this, and the Brain, Souls seem unequal.

Intemperate or Evil Conformation, the Spirits being made more dull, or hindred, cannot itradiate and actuate in their due manner; therefore the Phantasms are difficient or distorted, and the Faults or Vices of these infects the Intellect. Hence it very often happens, by reason of some hurt coming to the Brain, that the Faculties or Habits, or Ratiocination or Reasoning, howsoever strong, are diminished or taken away: Because, as the most Skilful *Gassendus* tell us, That *the acquisition and loss of an habit, stands in the Power of the Brain and Phantasie, a subject purely Corporeal; but that the Intellect, as it wants Parts, cannot be wrought upon by Parts, but that it is from the beginning, and of its own Nature, a full and perfect power of understanding; which understands, not more by the coming of any Habit, but is rather it self an Habit, always ready to understand: where-*

How the Habits of Reasoning are acquired and performed.

fore he says, that Aristotle *has hit the mark, when he says, that his Agent having its Intellect, as it were a Light, had it therefore as it were a certain Habit: to wit, when this Intellect, as it were a Light, is ever ready to illustrate; therefore it would have it self like to an Habit, in a Workman or Artist, to whom, when you give an Organ or Instrument, as an Harp to an Harper, he is presently ready to Play*; by which it comes to pass, as he says, *the Intellect also to come under such a Reason, like as Art comes under Reason, as to Matter:* So we may say, *As an Harper has in himself the Skill of Playing on the Harp, and if he shews not his Art, there is a defect, not of himself, but by reason of the absence or*

Gassendus, Ib.

the depraved disposition of the Harp; after the same manner, the Intellect is abundantly Instructed, in its own Nature, that it understands, and uses Phantasies, and if it may not do it, the cause is not in it self, but is either in the absence of the Phantasms, or their Imperfection. For indeed, as the same Author afterwards adds, *The chief Function of the Humane Intellect seems to be like that of the Angels, that it is of its own Nature, merely Intelligent, that is, Knowing things by a simple Sight, not by Ratiocination; But that darkness is poured on it dwelling in the Body, that it doth not perceive all that it understands, simply, nakedly, and as it were through the means of Intuition; but attains it very much by reasoning, that is, successively, and proceeding as it were by degrees.*

From these we may probably Conclude, or at least Conjecture, after what manner the Rational Soul remains in the other Corporeal, and using as it were its Eyes, and other Powers, understands; yea, and this mediating or coming between, she is said to be united to the Body, and to be its informing Form. As to the first yoaking of the one Soul with the other, thô the Rational Soul it self, and this, is altogether ignorant of its Birth, we

That the Rational Soul is Created and poured into the formed Body.

may affirm notwithstanding, what is Consonant to Holy Faith, right Reason, and to the Authority of Divines, who were of the chiefest note; That this immaterial Soul, for as much as it cannot be born, as soon as all things are rightly disposed for its Reception, in the Humane formation of the Child in the Womb, it is Created immediately of God, and poured into it.

Not propagated Ex traduce.

But that some have said, That the Rational Soul is propagated *Ex traduce* or of its Kind, for as much as oftentimes the Son, in respect of Wit, Temperament, Ingenuity, the Affections, and other Animal Faculties, is exactly like the Father, it follows not; because these Gifts and Offices proceed immediately from the Corporeal Soul, which we grant to be begotten by the Father, together with the Body, but not the Rational Soul. In what State this at last exists, being freed from the Body, and what Kind of Understanding and Knowledge it enjoys, is not easie to be determined; but

SeparateStates.

since we shall be like the Angels, we may think, that the separated Soul doth see all Objects with a Simple sight, and by no Corporeal Species, and wants no Ratiocination, for the discovering any thing lying hid in them. But this Speculation being let alone, as too airy, we shall further Consider, other Gestures and Manners of the Rational Soul, whil'st it lives in the Body; and as hitherto we have seen the Marrying together of it, with the Corporeal Soul, and the mutual Commerces and Friendships as to the Knowing Faculties of either, we will now consider the Disputes and Wranglings of

A Plurality of Souls in Man, is manifest by their differences.

these, which in respect of their Powers, often happen: because the Intellect and Imagination, do not agree in so many things; but that it, and the Sensitive appetite, are wont to disagree in more: from which Strifes may further be argued, the distinct means of the aforesaid Souls, both as to their subsisting and working.

In Man a twofold Knowing Power, and a twofold Appetite.

3. As there is said to be in Man a twofold Knowing Power, *viz.* The Intellect and the Imagination, so it is commonly affirmed, that there is a twofold Appetite, *viz.* The Will, which proceeding from the Intellect, is the Handmaid of the Rational Soul; and the Sensitive Appetite, which cleaving to the Imagination, is the Hand or Procures of the Corporeal Soul. Which Opinion, thô it be founded on the Sayings of the Ancient Philosophers; for that by *Plato* and *Aristotle*, The *Will is attributed to the Rational Part, and to the Irrational Lust and Wrath*; yet it ought not to be so taken, as if the Rational Soul, for that it is immaterial, and therefore esteemed without Affection, should be obnoxious to the Affections of desires or aversations, from every shaking approach of Good or

Evil,

Evil; of that being turbulent; for this indeed is repugnant to its incorporeal Nature, and to its Dignity and Prerogative above other Powers. Without doubt, in the Contemplation of Truth and Goodneſs, and eſpecially of that which is the ſum of either, in the doing of good Works, in the Knowledge of things by their Cauſes, and in the Exerciſes of Habits, both Scientifick and Practical, great Complacency happens to this; and on the contrary a certain diſpleaſure for the want of theſe. Moreover, the Love of God, of Virtue, and of all that is good, and the deteſtation of Vices, and of wicked Men; yea, and other pure Affections, and ſuch as are Simple, coming without perturbation or trouble, belong to the Rational Soul: In the mean time, *That ſhe* (according to *Plato*) *like the top of* Olympus, *might enjoy a perpetual Serenity, hath the whole heap of Perturbations below it ſelf, and in the irrational part, placed like Clouds, Winds, and Thunder, in an inferior Region, and under its feet.* And truly, all the vehement Affections or Perturbations of the Mind, by which it is wont to be moved, and inclined hither and thither, for the Proſecuting the Good, or ſhunning Evil, belong wholly to the Corporeal Soul; and are ſeen to obtain the ſame ſeat with the Phantaſie, within the middle or marrowy part of the Brain: (by what means the Paſſions alſo affect the *Præcordia* by conſent, ſhall be declared afterwards) in the mean time, the Intellect, even as it beholds all the Phantaſms, and Orders and Rules them at its pleaſure; ſo it not only perceives, but whil'ſt it is its ſelf, governs and moderates, all Concupiſcences, and Floods of Paſſions, that are wont to be moved alſo within the Phantaſie; and ſo, as it approves theſe Affections, and rejects thoſe, now excites others, now quiets them, or directs them to their right ends, the Rational Soul it ſelf is ſaid to exerciſe certain Acts of the Will or Power, by theſe kind of Dictates of hers, and that ſhe her ſelf wills or wills not, the ſame thing, which by her Permiſſion or Command, the Senſitive Appetite deſires or hates.

The Rational Soul of it ſelf without Affections; how it governs and orders the Phantaſie and Affections.

But the Corporeal Soul does not ſo eaſily obey the Rational in all things, not ſo in things to be deſired, as in things to be known: for indeed, ſhe being nearer to the Body, and ſo bearing a more intimate Kindneſs or Affinity towards the Fleſh, is tied wholly to look to its Profit and Conſervation: to the Sedulous Care of which Office, it is very much allured, by various Complacences, exhibited through the Objects of every Senſe: Hence ſhe being buſied about the Care of the Body, and apt by that pretext, its natural Inclination, and indulging Pleaſures, moſt often grows deaf to Reaſon, perſwading the contrary. Further, the lower Soul, growing weary of the yoak of the Other, if occaſion ſerves, frees it ſelf from its Bonds, affecting a Licenſe or Dominion; and then there may plainly be ſeen the Twinns ſtriving in the ſame Womb, or rather a Man clearly diſtracted or drawn ſeveral ways, by a double Army planted within himſelf; to wit,

In things to be Known, the Corporeal Soul obeys the Rational, but not in things to be done.

The Corporeal Soul inclining her ſelf to the Fleſh,

—Where Enſigns Enſigns meet,
And where with Arms, they one another threat;

Fights againſt the Rational.

This Kind of Inteſtine Strife, does not truly ceaſe, till this or that Champion becoming Superior, leads the other away clearly Captive. Althô in the mean time, to the Eſtabliſhing the Empire of the Rational Soul, alſo for the Vindicating of its Right and Principality, from the Uſurpation of the Senſitive Soul, the Precepts of Philoſophers, and Moral Inſtitutes are framed; and when theſe can do little, Sacred Religion gives far more potent helps, whoſe Laws and Precepts being rightly obſerved, are able to carry Man, not only beyond the Brutes, but himſelf, to wit, above his Natural State; for as much as they ſubject the Senſitive Soul to the Rational, and both to the moſt high God. But yet, ſuch a Divine Politie is not erected in Man, without great Contention: Becauſe, whil'ſt Reaſon uſing its proper force, and alſo Inſtitutes and Sacred Ethicks, endeavours to draw the Faculties of the Corporeal Soul to its Party, ſhe riſing againſt it, adheres pertinaciouſly to the Fleſh, and is hardly pull'd away from its Blandiſhments; yea, what is to be lamented, it ſeduces in us the Mind or Chief Soul, and ſnatches it away with it ſelf, to role in the Mud of Senſual Pleaſures: So that Man becomes like the Beaſt, or rather worſe; to wit, for as much as Reaſon becoming Brutal, leads to all manner of Exceſs. But indeed, 'tis not always ſo with the Empire of the Mind, but that ſhe returning at length, ſometimes on her own accord, or awakened by ſome occaſion, and knowing of its fall, ariſes up againſt the Senſitive Soul, as againſt an Enemy or Traitor, caſting her out of her Throne, commands her to Servitude; yea, ſometimes by reaſon of ſome wickedneſs committed, it compels it to torment it ſelf, and its Lover the Fleſh, and ſo to expiate as much as it may, its faults, by inflicting on it proper Puniſhments. Indeed, theſe kind of Acts and Affections of Conſcience, near to Man, plainly ſhews, that there is in him either two Souls ſubordinately, or at leaſt the Parts of the ſame are far different; to wit, when one of which oppoſes the other, and either ſtrives for the obtaining of Proſelytes, it happens that Man is hurried into contrary Endeavours, and is acted little leſs than like a Dæmoniack poſſeſs'd with a Legion. But

How it is reduced to Obedience.

It often ſeduces the Mind.

Wars are moved between them.

Affections of Conſcience nigh to Man.

having propoſed theſe things, concerning the Rational Soul, (which we have touch'd only by the by, as beſides our purpoſe) we will return to the Corporeal, and as we have illuſtrated its Eſſence, Hypoſtaſis, and Integral Parts, we ſhall now deſcend to the Explaining of its Affections, or Paſſions.

But in the mean time, as we have ſhewn, by comparing the Corporeal Soul of the Brute, with the Rational of Man, what vaſt difference there is between them, perhaps it might be to the purpoſe, to compare the Brains of either, and to obſerve their differences. But this Anatomy being elſewhere made, we have noted little or no difference, in the Head of either, as to the Figures and Exterior Conformations of the Parts, the Bulk only excepted; that from hence we concluded, the Soul Common to Man with the Brutes, to be only Corporeal, and immediately to uſe theſe Organs. But as we have ſhewn the deſcription of a Sheeps Brain, diſſected within the *Cortex*, and as it were made bare of Fleſh, whereby all the Interior Parts might appear, we ſhall here alſo, to Crown the work, give you the Figure of an Humane Brain; ſo as all the inward Parts may be laid open.

The Eighth Table,

Contains a new Anatomy of the Humane Brain, where, by a Diſſection with an Inſtrument made thorow the Bill, the Callous Body, and the Fornix or Arch, and their Parts being taken away and ſeparated; the ſtreaked Bodies, alſo the Optic and Orbicular Prominences, one ſide eraſed, and the other whole and plain, are Exhibited.

A. A. A. A. *The Hemiſphear of the Brain divided and ſeparated by themſelves.*

B. B. B. B. *Portions of the Callous Body with the Fornix cut off, and removed apart.*

C. *The Baſis of the Fornix, with its Roots, which cohered with its Trunk* Y Y; *divided Portions of which, with Cuttings off of the Callous Body, are laid apart on the right and left hand.*

D. *One ſtreaked Body ſcraped or Eraſed, that the Medullary ſtreakes or nervous Tracts may appear.*

E. *The formoſt border of this Body, ſticking to the right Hemiſphear of the Callous Body.*

F. G. *The Baſis and the Cone, of the ſame Body.*

H. *The hinder Border of the ſame, in which the Optick ſtreaks, yea and other Medullary Proceſſes, are ſent from the Orbicular Prominences.*

I. *The ſtreaked Body of the left-ſide plain, with the Veſſels creeping thorow them; whoſe Borders and Ends are made after the ſame as in the right.*

K. *The right Optick Chamber eraſed, whoſe Medullary ſtreaks, being ſtrait and thick ſet,* K.K. *are ſtretch'd forth, into the Border of the ſtreaked Body.*

L. *The right Nati-form Prominence in like manner eraſed, with ſtreaks ſtretched forth into the Medullary Proceſs* M.

M. *The Medullary Proceſs, which proceeding from the Teſtes, and compaſſing about the Nates, ſends from thence other Medullary paſſages into the ſtreaked Body, as more plainly appears in the left ſide being whole.*

N. *The Pineal Kirnel in its proper place.*

O. O. *The Orbicular Prominences called Teſtes, Marrowy thorow the whole.*

P. *The left Nati-form Prominence plain and whole, which is ſmaller in Man, and for the moſt part Marrowy.*

Q. *A Medullary Proceſs, Compaſſing the Nates, from which is ſent one Medullary Pipe or paſſage* R. *towards the Cone of the ſtreaked Body, and another* S. *towards its Baſis; of which by and by a forked branch goes forth, one* r. *to the middle of the ſtreaked Body, the other* s. *to the corner of its Baſis.*

T. *A Tranſvers ſhoot knitting together the aforeſaid Branches.*

V. *The hinder Borders of the ſtreaked Bodies, joyned together among themſelves.*

W. *The Gap or Chink leading to the Tunell.*

X. *The Gap or Chink, leading into the Cavity, lying under the Orbicular Prominences.*

Y. *A Medullary Proceſs, leading from the Oblong Marrow, into the Cerebel, which ſeems to be the root of this.*

Z. Z. *Separated Portions of the Cerebel cut off, that its Tracts both Marrowy, and Cortical or Barkie, may be ſeen.*

X. *The Cavity or hollowneſs lying under the Cerebel.*

CHAP.

Tabula VIII

CHAP. VIII.

Of the Paſſions or Affections of the Corporeal Soul in General.

THe whole Corporeal Soul, ſo long as ſhe is quiet and undiſturbed, ſhe is fittted to her proper Body equally, as to a certain Cheſt or Cabbinet, and waters all its Parts gently, both with little Rivulets of Blood Circulating, and actuates and inſpires them every where with a gentle falling down of the Animal Spirits; But it ſometimes happens, that the whole Conſtitution of this ſame Soul, is ſo ſhaken and moved, that both the Blood being interrupted in its equal Circule, is compelled into irregular Excurſions, and Recurſions, and various Fluctuations; and alſo, that the Animal Spirits being ſnatched hither and thither, inordinately perform the Acts of their Functions: yea, the Animal Spirits themſelves, whil'ſt being moved irregularly, do ſhake the *Præcordia*, and flow into them in an undue manner, cauſe the Courſe of the Blood more to be perverted. Further, from the Corporeal Soul being diſturbed, not only the Animal Spirits, and Rivers of the Blood, are driven into diſorders, but they induce alterations both to the other Humors, and to very many Parts and Members of the Body, and to the Rational Soul it ſelf, in Man. As there are manifold Examples of theſe kind of Perturbations, by which, the Corporeal Soul being too much ſwell'd up, or Contracted, or otherways diſtorted, it becomes as it were unequal, and not Conformable to the Body, the Chief of them may be referred to theſe two Heads. To wit, Firſt, Sometimes this Soul, as it were leaping forth, erects and ſtretches out it ſelf beyond meaſure, and ſo dilating its *Hypoſtaſis*, deſires to reach it ſelf beyond the bound of the Body: Hence the Animal Spirits, being reſpectively moved, in the Brain, enlarge the Sphear of their Irradiation, and as they ſo ſhake the *Præcordia*, by a more full inflowing, they Compel the Blood therefore to be ſnatched together, and to be poured forth more freely into all the Parts. Secondly, Sometimes on the contrary, this Soul being ſtruck, is more narrowly Compreſſed within it ſelf; ſo that being drawn inwardly, and ſinking down within its wonted Compaſs of Emanation, becomes leſs than the Body; wherefore, the Animal Faculties wonderfully flagg, and their Acts are either ſluggiſhly or perverſly performed: Moreover, the *Præcordia* alſo being deſtitute of their due influx of Spirits, almoſt ſink down, and ſuffer the Blood to ſtay too long there, and to ſtagnate oftentimes. There are beſides ſome other Geſtures of the aforeſaid Soul, by which the ſame departing from its equal Expanſion, becomes not Congruous to the Body; and in theſe kind of Caſes, chiefly the Senſitive Power, according to the received Impreſſions, affects a new Species, and brings the Brain and Imagination into its Party: Then by and by, by the paſſage of the Nerves, it affects the *Præcordia*, as it were with a certain ſtroke, and determinates them after her meaſure; ſo that according to the Idea received from the Imagination, the Motion of the Blood is Compoſed, as it were after the meaſures of a Dance: we ſhall add anon Inſtances and Examples of theſe, when we ſhall treat of the Paſſions particularly.

A Twofold ſtate of the Corporeal Soul: Tranquil or Quiet,

And Diſturbed.

In which either part of the Soul is moved.

And is either too much inlarged,

Or Contracted.

The Trouble of the Soul, impreſſed on the Senſitive Part, by and by is Communicated to the Blood.

In the mean time, that we may inquire into the Cauſes of the Paſſions in general, it plainly appears from what hath been ſaid, that the Corporeal Soul is found under a twofold ſtate, to wit, either of Quiet or Commotion: That ſhe is like a Calm Sea, with a ſmooth Superficies, and ſquared altogether gentle and ſerene; or ſhe becomes troubled, like water ſhaken into various Circles, and wavings by the blaſts of the Winds, or by ſome ſolid things caſt into it. The former ſtate of the Soul is perceived, not only in Sleep, when the Spirits are bound up, or lye quiet of themſelves; but often in Waking, to wit, as often as objects or ſenſible things, being brought from without, or imaginary things conceived within, do import nothing of Good or Evil to us, and that we only know and apprehend them: for ſo, without any Trouble or Moleſtation, they pleaſantly ſlide into the common Senſory and Imagination, and thence quickly paſs away; but if the object is offer'd under the Species of Good or Evil, preſently the Senſitive Soul prepares for the embracing or the avoiding it; and not only procures to its Endeavors the Animal Spirits, but alſo the Blood and Humors; yea, draws the ſolid Parts to help her. For as ſoon as the Imagination conceives any thing that is to be embraced or ſhuned, preſently the Appetite is formed by the Spirits inhabiting the Brain, ordered into a Series; then by an impreſſion ſent to the *Præcordia*, as they are either dilated or contracted, the Blood is carried into various Motions of Fluctuations, and then by an inſtinct of the Appetite tranſmitted to the proper Nerves, the reſpective Motions are drawn forth: And upon theſe kind of Furnitures and Affection of the Spirits and Humors, and of the ſolid

The quiet of the Soul happens not only in ſleep, but often waking, when pleaſing or unhurtful things are met with. On the contrary when from the Objects, Good or Evil is promiſed: Then firſt the Imagination afterwards the Appetite is moved.

solid Parts, the Affections or Passions of the Mind wholly depend, we have elsewhere shewed, after what manner, and by what Trajection or Irradiation of the Spirits, within the Nervous Processes, such quick Commerces are made, between the Brain and the *Præcordia*, and between both these and other Motive Parts.

But that we may yet more fully describe the Affections or Passions of the Corporeal Soul, as they are chiefly to be found in Man, it is here to be noted, That not every Species or Appearance of Good or Evil, does excite these Commotions of the Soul: because we behold undisturbed the prosperous or adverse things of others, not related to us: But further, 'tis requisite that the Goodness or the Malice of the Object belongs properly to a Man, altho what happens to our Friends or Relations, is as if it happened to our selves. Also besides, Good and Evil happen to the same Man after various ways, and under a diverse reason, both in respect of the Object, and also in respect of the Subject. Concerning the former we shall speak anon: As to the other, Good or Evil being brought to Man, either respect the Corporeal Soul by it self, and as it were abstracted from any other Relation; or they respect her as conjoyned to the Body, and intimately dear to her: Or lastly, they respect her, as subdued by the Rational Soul; so indeed, altho the Affection is continually poured into the Corporeal Soul, yet it respects Good or Evil, either of this, or that, or of another Subject, and is excited for the sake of that: And according to this threefold Relation of the Sensitive Soul, the Passions by which she is affected, are called either Physical, or Metaphysical, or Corporeal or Moral; we shall discourse singly, and a little more plainly of these.

The Reason of Good and of Evil, either concerns, The Corporeal Soul by it self. Or her united to the Body, Or her subjected to the Rational Soul. Hence Passions are called either Physical, Metaphysical, or Corporeal.

First, Therefore, as to the Passions merely Physical, we say, That the *Sympathies* and *Antipathies* of a diverse Kind, which are as it were proper and intimate Affections, seem to belong to the Corporeal Soul by it self, and abstracted from all Relation: Besides, the highly attractive Species of Beauty and Fairness, by the sight of which this Soul is wont to be insnared, most certainly; so that neglecting the Care of the Body, and laying aside the dictates of Reason, cleaves most closely to her Lover: Also sometimes less fair things which every whole Man would forsake, snatches this Soul, drawn as it were by Witchcraft, and leads it Captive; as indeed, lost Lovers, though they see better things and approve them, yet follow the worse; the reason of which is, that the Sensitive Soul enters into Friendships, of which the Affections are not knowing, with certain things in Secret, and inseparably and firmly loves them. Concerning *Antipathies* we meet with many things to be admired, as some sensible Objects, innocent of themselves, yea and grateful enough to many Men, and sought with delight, become most horrid to some others, and more Killing than the Head of *Medusa* at the sight only: So some abhor the presence of a Cat, others an Eel, or Toad, and others this or that Dish of meat made ready. Nor do they only fly things by the sight, but also received by the smell, yea, when they lye hid, and are not at all suspected, they suffer Swounings and Fainting of their Spirits, by their secret Influence: These Kind of Affections without doubt, proceed from occult Enmities of the Sensitive Soul; for when it happens this *Systasis* or Disposition of the Animal Spirits, by the meeting of some Object, to be driven into Confusion, it ever after that abhors the coming of the same, or its Contact by its Effluvia's.

Passions merely Physical, are Sympathies and Antipathies.

Some Instances of Passions merely Physical.

Secondly, Sometimes the Sensitive Soul receives the Superior Rational Passions, which we call *Metaphysical*; and solicitously busying it self concerning their Good and Evil, it either draws forth or shortens the Compass of its Expansion. For indeed, the Rational Soul relying on the help and familiarity of the Spirits dwelling in the Brain, aspires to Metaphysical Notions, which having more fully learnt, it not only falls upon higher Speculations, but also exerts a certain Superior Appetite, to wit, the Will, and implicates it with certain Affections, as it were inspired of God; the exercise of which sort of Sacred Affections are not performed by the mere Conceptions of the Mind: But their Acts being delivered from the Rational Soul into the Sensitive, do first employ the Brain with the Phantasie, then being transmitted from the Brain into the Breast, there, for that they produce in the Heart and Blood variety of Motions, receive their Complement or Perfection: Wherefore, in the Worship of God, Piety and Devotion are attributed very much to the Heart: Hence Repentance, the Love of God, and Hate of Sin, Hope of Salvation, Fear of Divine Vengeance, and many other acts of Religion, are wont to be ascribed to the work and endeavour of the Heart. The reason of which seems to be, for as much as the whole Corporeal Soul is Commanded by the Rational Power, that in Adoring God, she should very much bow her self before the Deity, and as it were lye prostrate on the Ground; therefore, presently both Parts of it, *viz.* both the Sensitive and Flamy, do repress themselves, and restrain their wonted Emanations; hence plenty of Animal Spirits being drawn from the Phantasie, for the more full actuating the Organs of the Senses, they bestow the Operations of the Nerves on the *Præcordia*, which

Passions Metaphysical.

By these first the Rational Soul.

Then the Sensitive and Sanguineous part of the other are affected.

which whil'ſt they are more ſtraitly drawn together, and as it were conſtrain'd, cauſe the Blood to ſtay longer within the boſomes of the Heart; and ſo inhibit it, leſt it ſhould be too much inkindled within the Lungs, and leſt being inkindled by the Heart, in the whole Body, and chiefly ſhould be carried rapidly into the Brain. For indeed, the Blood containing Life as a moſt precious Jewel in it ſelf, is not only heaped up more plentifully about the *Præcordia*, in all Fear and Danger, and is there lay'd up as it were for defence ſake, that it might better preſerve its Flame: But further, in devout Affections, whil'ſt the Rational Soul orders the Spirits inhabiting the Brain into ſacred Conceptions and Notions; by the Influence of the ſame Spirits, the Boſomes of the Heart are alſo ſo affected, that they cauſe the Blood to Centre, and to be more fully drawn into them, and there longer retain it, as it were an *Holocauſt* to be offered to God: ſo as often as we Pray moſt earneſtly, we endeavour nothing leſs, than that our Life with the Blood, be laid upon the Altar of the Heart. For truely, almoſt every body experiences in himſelf that in ſtrong Prayer, the Blood is more and more heaped up in the Boſomes of the ſwelling Heart: wherefore, that the Vacuities of the Lungs might be ſupplied, we breath deeply, and ſo the Air being more fully drawn in, the Muſcles of the Breaſt, and the *Diaphragma*, are detained almoſt in a continual *Syſtole*, or more often iterated; to wit, for this end, that the Vital Blood, to be offered as it were a Sacrifice to God, ſhould be there kept, nor ſuffer'd to go from thence, or to be inlarged, till as it were by a long immolation, together with Prayers, lieve may be had from the Godhead. Yea, 'tis to be obſerved, that thoſe religiouſly affected, are apt at all times to call back the Blood towards the *Præcordia*, and to repreſs it from a more plentiful Excurſion, which may give a looſe to Delights or Mirth: Becauſe 'tis juſt, that this Vital Humor ſhould be Conſerved, even Holy and Pure for God; and as it is ſo reſtrained in the *Præcordia*, leſt it ſhould grow too luxurious, nor be carried towards the Brain with too impetuous a Rapture, the Conceptions alſo of the Mind, without much heat and diſtraction of thoughts concerning Divine things: Hence it is, that Drinking of Wine, Banquetting, and every Kind of Diſſolute Life, becauſe they render the Blood lawleſs, and not able to be reſtrain'd or bridl'd, are ſaid to make hard the Heart, and to obſtruct the Duties of Religion. Further, not only the devout Acts of Religion, and Pious Affections, are attributed to the Breaſt and *Præcordia*; but alſo the ſober Counſels of Wiſe men, yea, and the Exerciſes of Virtues and Moral Habits, are ordinarily aſcribed by Philoſophers to this Seat or Subject: Hence Wiſe men are ſaid to be *Cordati*, Hearty, or ſage of Heart; but when one that is unwiſe or plainly fooliſh, doth a thing, it is ſaid, That there is nothing leaps in the left part of his Breaſt: The reaſon of which ſeems to be, that when as the Animal Spirits (which are the immediate Inſtruments of thoughts) are procreated altogether from the Blood, not only their more excellent diſpoſition, but their right and timely Diſpenſation, depends chiefly on the *Præcordia*. For to theſe are owing, that the Blood be inkindled in its due manner, and alſo Eventilated, that it may give to the Brain firm and ſtable Animal Spirits, which however Subtil and Active, yet may not be volatile beyond meaſure; and hence the Solidity of the Mind, and the ſharpneſs of Judgment are produced: When on the contrary, by reaſon of the Blood more ſlowly paſſing thorow the *Præcordia*, or more ſwiftly than it ſhould do, the Animal Spirits become too fixed, or volatile above meaſure, and therefore either a ſtupidity or lightneſs of Mind ariſes. But in truth, Wiſdom is much rather aſcribed to the Heart, for as much as from thence reins are put upon the Blood, apt for fierceneſſes and Impetuoſities, leſt that ruſhing into the Brain, with an inordinate rapture, ſhould not only diſturb its ſerious Cogitations, but ſtir up enormous Motions of the Appetite, and mad Luſts. For truely, whil'ſt the Spirits inhabiting the Brain, are diſpoſed by the Intellect, from thence preſiding within the Imagination, into Series and Orders of Notions, the Blood about to break forth from the Heart, ought very much to be reſtrained, leſt that growing luxurious, it ſhould confound all things by an importune evaſion of the Brain, and ſhould agitate the Spirits, called away from this work into Commotions, and various Fluctuations; wherefore, from the immoderate drinking of Wine, for as much as by it the Blood is made more head-ſtrong, and will not be repreſſed or contained by the Heart, Men become not only unable for Exerciſing the Acts of Judgment and Reaſon, but are found very prone to all manner of Wickedneſs and moſt filthy Deſires.

Wherefore, and how the Præcordia *are eſteemed the ſeat of Holy Affections.*

What it is to have the Heart hardened.

Wherefore the Præcordia *are called alſo the ſeat of Prudence and Wiſdom.*

As to the Moral Paſſions, or by us called Corporeal, we may obſerve, that the Senſitive Soul is more often and eaſilyer affected, by reaſon of Good or Evil, which is o' its Subject, that is of its Body, which includes its good Habit. Altho alſo, ſhe hath her proper and occult Loves and Averſations, and is bound to ſhew due obſequiouſneſs to the Rational Soul; for as much as it is united to the Body, as it were by a Conjugal Compact; therefore, all other relations being lay'd aſide, it minds only thi; Concerning the Care of it 'tis moſtly ſolicitous, and by reaſon of its proſperous o adverſe Affairs,

Three Corporeal or Moral Paſſions.

Affairs, it is wont to be affected with Pleasure or Grief, and other Passions depending on either of these.

For indeed (as we mentioned before) there are two Chief and Primary Gestures of the Sensitive Soul, as often as it is moved from its wonted and Natural State or Condition; to wit, either she stretches forth her self into a greater Compass, by profuse Pleasure, as if it affected to be dilated beyond the bounds of the Body: or being overthrown by Sorrow or Grief, she is contracted more narrowly, and runs her self within the wonted Sphear of her Emanations: from this twofold Affection of the Sensitive Soul, all the other Passions take their Origine. For truly Pleasure, or an Elation of the Soul, is its most pleasing Constitution, which desiring to gain for it self by any means, it follows all Objects promising it, with Love, Desire, Hope, Faithfulness, Boldness, and other means of getting it; On the contrary, Sadness or a Contraction or Dejection of this Soul, is a Gesture most ungrateful to it; what things then soever threaten or induce it, we endeavour to remove away far, by Fear, Hatred, Anger, Desperation, Shame, Pusillanimity, and other motions of shuning it. In the first place therefore, we will speak briefly of Pleasure and Grief, which are according to *Aristotle*, as it were a forked measure of the Sensitive Appetite, for the double Ladder of Affections, flowing thence, by which she is carried to this or that.

The two Primary Gestures or Affections of the Soul, are Pleasure and Grief.

First, Pleasure and Grief, because they bend or incline the whole Corporeal Soul after a diverse manner; therefore its two roots, to wit, the Brain and *Præcordia*, are chiefly affected. When the Soul is stretched forth in Pleasure, and is drawn to its utmost Sphear of Irradiation, the Animal Spirits being carried within the Brain, stir up most pleasant and pleasing Imaginations; and further, they actuating lively the Nervous *System*, Cause the Eyes, Face, Hands, and all the Members to shine, and as it were leap forth; Further, then more fully shaking also the *Præcordia*, by the Influence of the Brain, delivered by means of the Nerves, they thrust forth the Blood more rapidly, and as a Flame more brightly inkindled, they pour it forth with strength thorow the whole Body. On the contrary in Grief, whil'st the Soul sinks down, contracted into a more narrow space, the Spirits inhabiting the Brain, as it were struck down by flight, and troubled, put on only sad and fearful Imaginations, from whence the Countenance is cast down, the Limbs grow feeble, and the *Præcordia* being contracted or bound together, by reason of the Nerves carrying the same affection from the Brain, restrain the Blood from its due Excursion, which being therefore heaped up in the same place, with a weight, brings in a troublesome oppression of the Heart, and in the mean time, the Exterior Parts being deprived of its wonted afflux, languish and Contract a paleness.

They affect the two Roots of the Soul, to wit, the the Brain and the Præcordia.

The aforesaid Affections of Pleasure and Sadness, which is wont, the Imagination being employed, to be poured from thence on the *Præcordia*, and by and by from that double Root into the whole Corporeal Soul; as to their first Originals, wholly depend upon the Sense. For from the beginning, Sensible Objects affect the Sensory with a certain sweetness or asperity, and there bring to the Spirits a certain Ovation or Triumph, or Confusion: from whence presently the Impression, like a waving of Waters, being Communicated to the Brain, excites the Spirits inhabiting it, into a consent either of the delight or trouble; and this Affection, being delivered from the Sensory to the Imagination, if it be short, there ends, and is not carried to the *Præcordia*: but if the stroke, being carried from the Sensible Object, is, like a more strong waving of Waters, impressed more vehemently, it reaches from the Sensory to the Brain, and presently thence to the Breast, that the Motions of the Heart and Blood, are intangled together with the disorder of the Animal Spirits, so as to the first Conceptions of the Affections, as well as Notions, there is nothing in the Imagination, or I may rather say, there is nothing in the Brain or Heart, that was not first in the Sense: But afterwards, when many Idea's of Pleasures and Griefs, are impressed on the Phantasie and Memory; then very often without any previous Sense, or feeling of Pleasure or Sadness, the Imagination being repeated, is wont to excite a Passion of the pleasant or troublesome thing; for when at any time we conceive in our Mind Good or Evil things belonging to us, not only present, but also past, or to come, that Conception employs the Phantasie, and not rarely very much exercises it: Further, being thence transmitted to the Breast, it inordinately either Contracts or Dilates the Breast, and so pours forth the Affection, together with the disturbed Blood, on the whole Body. A Wise and Strong man easily moderates the passions of Pleasure or Grief, lest these being brought, either from the Sensories, or suggested from the Memory, should affect the Phantasie and the *Præcordia*, by too great a waving; For the Brain and Heart, which are the supports of the Soul, ought not to be moved much, by the more light Objects of the Senses; nor are these principal Powers, at leisure to be present at every small thing: Hence some have born the torture of the Body, or the cutting off Member, beyond Stoical Patience, undisturbed; whil'st others (in whom the sensible

Grief and Pleasure first of all arise from the Sense.

Afterwards, both from this, and also from the Phantasie, and Memory.

Some are more Pathetical, or moved than others.

ſenſible Species, being above meaſure increaſed, vehemently ſhakes the *Præcordiâ*) the Skin ſcarce wounded, ſwoon away, or fall into fainting Fits. In like manner it is obſerved, that ſome are carried away by a moſt light Pleaſure of the Senſes into ſoftneſs and Luxury, in the mean time others are ſcarce moved with any Pomp of Delights, or Exquiſite Blandiſhments of Pleaſures. It is obſerv'd in the fruition of a pleaſing Object (which alſo holds of the appulſe of a pleaſant, or a painful ſenſible thing) there happens a certain reciprocation, between the Spirits of the Brain, and the Inhabitants of the Senſory. We imagine the Drinking of excellent Wine, with a certain Pleaſure, then we indulge it; the Imagination of its Pleaſure is again ſharpned by the taſte, and then by a reflected Appetite drinking is repeated: So as it were in a Circle, the Throat or Appetite provokes the Senſion, and the Senſion cauſes the Appetite to be ſharpned, and iterated; this Kind of mutual reciprocation of the Animal Spirits from the Brain to the Senſory, and on the contrary, perſiſts for ſome time, till the ſame, like waving of Water, either leiſurely vaniſhes, or is obliterated, by the exciting of a new waving: So indeed, Paſſions and Deſires wear out themſelves, or are conſumed by time, or they are blotted out by the coming of ſome other Paſſion. When the Animal Spirits, deſiring too much a ſenſible Delight, do often, and for a long time iterate and intend the Appetite, and Act of the pleaſurable Senſion, there is need of Reaſon to come between, whereby they being changed into Sacred and Moral Meditations, may be called away from their Carnal Genius; which Avocation however, they obey not but difficultly and unwillingly; for as much as to be expanded, and to enjoy pleaſing Objects, is the Recreation and Food of the Spirits; and to be reſtrained or kept in, and very much to be employed about the works of the Mind, is to them a Labour, ard a difficult task.

How the Affections are wont to be iterated, alſo how allayed or obliterated.

CHAP. IX.

Of the Paſsions Particularly.

CConcerning the Number of the Paſſions, as it hath been variouſly diſputed among Philoſophers, ſo in famous Schools, this Diviſion into Eleven Paſſions, long ſince grew of uſe; to wit, the Senſitive Appetite is diſtinguiſhed into Concupiſcible and Iraſcible, to the firſt, are counted commonly ſix Paſſions, *viz.* Pleaſure and Grief, Deſire and Averſion, Love and Hatred; but to the latter five, *viz.* Anger, Boldneſs, Fear, Hope, and Deſperation, are wont to be attributed: But this diſtribution of the Affections is not only incongruous, for that Hope is but ill referred to the Iraſcible Appetite, and Hatred and Averſion, ſeem rather to belong to this, than to the Concupiſcible: But it is alſo very inſufficient, becauſe ſome more noted Affections, as Shame, Pity, Emulation, Envy, and many others, are wholly omitted: Wherefore, the Ancient Philoſophers did determinate the Primary to a certain Number, then they placed under their ſeveral Kinds, very many indefinite Species. Truely the Senſitive Soul, like a *Proteus*, is wont to be ſo diverſly diſturbed and altered, into manifold Kinds, with the various Fluctuation, and divers ſorts of Inclination of the Animal Spirits, Blood, and other Humors, that a cenſe or view of all the Paſſions, can ſcarce be had; But however, that theſe, if not all, at leaſt the chief of them, may be in ſome meaſure diſcovered; we will here ordain Pleaſure and Grief for the extreams, or the oppoſite bounds of the Inclinations of the Corporeal Soul, then we will conſider, after what manner, the Objects belonging to either, by what means ſoever may be applied, and what ſorts of Impreſſions they are wont to fix on the Spirits, Blood, and ſolid Parts. The Corporeal Soul therefore, affecting Pleaſure as the greateſt height of its felicity, in which it would acquieſce, is moved at the appearance of any Good: if it be to come, and contrary to opinion, by and by for the getting it, Deſire or Love ariſes; if with Opinion, Hope and Boldneſs; if Opinion eſteems Fruition hopeleſs, Deſperation is raiſed up; if this Good be paſt, or ſhould be loſt by our default, Shamefacedneſs or Repentance is brought in; if it be poſſeſſed by others, Emulation, and Envy; Love is buſied about it being taken abſolute, without reſpect to time or poſſeſſion. Beſides alſo there are other reſpects and habitudes of appearing Good, able to excite many other Affections with eaſe. In like manner on the contrary ſide, Grief or Trouble, is a Sickneſs of the Senſitive Soul, and a Diſpoſition very much ingrateful to it; wherefore, at all the Objects apparently threatning its Induction, the Soul

The Number of the Paſſions uncertain.

Pleaſure and what Affections are ſubordinate to it.

Love, Hope, Boldneſs, &c.

Grief with the Affections ſubordinate to it.

variouſly Contracts her ſelf, and is inclined hither and thither, that ſhe might ſhun the approaches of the threatning Evils: wherefore there are ſo many Affections reſpecting Grief, and Subordinate to it, as there are means by which the Senſitive Soul, or the Diſpoſition of the Spirits, compoſes her ſelf for the ſhaking off or the ſhunning of any Evil. Hatred is buſied about Evil taken abſolutely; that being abſent, we proſecute with Averſion, by and by about to come with Fear; and unworthily brought, with Anger; falling upon our ſelves, we ſuſtain it with ſadneſs; inflicted on our Friends, with Pity. There are beſides, many other Appearances of approaching Evil; for the ſhunning of which, the Soul is compelled into many Metamorphoſes, and at the ſame time draws into the like Geſtures, as it were Mimical, the Humors and Members of the Body, and oftentimes the Rational Soul it ſelf: As it would be a buſineſs very tedious, and of immenſe Labour, to rehearſe all the Kinds of Paſſions, and to unfold them, we have deſigned therefore to ſpeak only of the Chief Species of the Paſſions, with their manner of affecting, in reſpect both of the Body, and alſo of the Superior Soul.

Hatred, Averſion, Fear, &c.

Next to Pleaſure and Grief, are Love and Hatred.

Love and Hate follow next, and as it were at the back of Pleaſure and Grief: becauſe the Senſitive Soul, being greatly prone, as hath been ſaid, to Pleaſure, Proſecutes all things apparently Good, without reſpect to Circumſtances, with an Univerſal and moſt ample Affection of Love; in like manner, ſhunning Grief or Trouble; it hates and deteſts all things apparently Evil, which may ſeem to induce Evil by any manner of way.

The Objects of theſe, are Senſible or Imaginary things.

The Good exciting Love, is objected after a twofold manner; to wit, either to the Senſe, or the Opinion: As to the firſt, Objects which conſiſt of Particles Congruous and Curiouſly fitted to the Senſory, ſo that they ſtroke gently the Spirits there flowing, and cauſe them to run and to rejoyce together, theſe bring forth a deſirable Senſion, whoſe Impreſſion being tranſmitted, by the paſſage of the Nervous Proceſſes to the Brain, by pleaſing there in like manner the Spirits, ſtirs them up into a pleaſant apprehenſion of the ſenſible thing, and a deſire of it: Hence theſe Spirits inhabiting the Brain, for the fruition of this Object, try ſeveral or manifold Endeavours, *viz.* Some being reflected towards the Senſory, deſire to cleave more cloſely, and to be united to this Good: in the mean time, others flowing towards the Breaſt, ſometimes dilate and open the Boſoms of the Heart, that they may more plentifully receive the Blood, imbued with a certain Virtue of the Object, and enjoy it; and ſometimes the Spirits draw together theſe receptacles of the Heart, and drive outwardly the Blood, as if about to ſeek ſomething more largely of Good, from the Object, with which being filled at laſt, it is received by the heart, by and by dilated. Further, in this Affection of Love, concerning the ſenſible Object, if that it be very ſtrong, the whole Senſitive Soul, or the whole *Syſtaſis* of the Spirits is inclined towards the beloved thing, lifts up to it the whole Nervous *Syſtem*, and together with the ſolid Parts, draws, and leads the Humours; ſo, when we are indulged with a fair Aſpect or Melody, the whole Soul ſeems to go out at the Eye or the Ear, and neglecting the other Senſories, Conſpire with their proper Offices into thoſe Acts of Senſion.

By what means deſirable things affect the Spirits, and the Blood.

A Pleaſant Senſation is deſcribed.

Love is excited by Opinion.

It is ſomewhat otherways in Love excited through Opinion, becauſe in this, the Species of the Object being repreſented by the Imagination, is erected as an Idol in the Brain; about this many Spirits being employed, at firſt they weigh the noted Beauty, and its various Ornaments, then they worſhip it; for whatſoever we love, we imagine it fair, profitable, pleaſant, and far above what in truth it is; then by reaſon of theſe kind of feigned Attributes, we more earneſtly fall in love with the thing beloved; Further, the Spirits inhabiting the Brain, invite all the reſt, flowing in the whole Nervous ſtock, to the worſhip of the Idol erected by themſelves: wherefore the Inhabitants of every Senſory, watching for the works of the Senſes, look hither; here alſo they wait for the Motions, Executors of the Limbs and Members; but they chiefly inſpire the *Præcordia* with the Love of this Imaginary Good; wherefore, theſe being variouſly dilated, and thruſt together, greedily receive, ſometimes the Blood imbued as it were with the Character of the thing loved, and as it were imbibe its Influence, ſometimes they caſt forth that Humor from themſelves, towards the Brain, as it were to pick out ſomething from the Image of the Good: This Kind of Image exciting Love, is impreſſed on the Imagination, either from the Intellect, or from the Memory and Phantaſie, to wit, one of them only, or both together; and from thence a Paſſion of Love is brought in, either Metaphyſical, or merely Senſitive, or mixt.

The Object of this, is ſet up, like an Idol, in the Phantaſie,

And Worſhipped.

Hatred excited, by the Senſible or Imaginary Species.

Much after the ſame manner as we have ſaid of Love, the evil Appearances alſo, which excite Hatred or the Averſation of the Soul, are objected to the Senſe or Imagination: As to the former, when any incongruous and improportionate Object, is brought to any Senſory, that diſtracts and drives the Animal Spirits into a certain Confuſion; therefore afterwards, when ſuch an Object comes again to the ſame Senſory, the Spirits mind-

ful

ful of their former hurt, abhor the Contact and approach of this Evil, Contract as much as they can the Organ, and ſhut up the Paſſages and Doors; if they are ſtrong they endeavour to remove the Enemy from themſelves, by ſudden and iterated Excurſions; but if they are not able for ſuch Aſſaults, they convey and hide themſelves within, and reject the embraces of the hateful thing, by every manner of way. A rejection of the ſenſible Object happens, when ſtinking Odors of very unſavoury Meat ſtrike the Palate, or Noſtrils; and the like when incongruous things are offer'd to the ſight, or hearing: But eſpecially, when the breaking of the Unity happens to be inflicted by Fire, or a Sword, on the Skin or Fleſh. Concerning theſe repulſes of the approaching Object, not only the Spirits flowing in the Senſory, but oftentimes alſo by the conſent of theſe; others inhabiting the Brain, are irritated into Fury; ſo that the Imagination conceives a deteſtation of the thing; and the *Præcordia* being therefore diſturbed, ſometimes draws back the Blood, ſometimes drives it outward towards the driving away the Evil, and ſtirs it up to its Expulſion.

How the firſt of theſe Affects the Spirits and Blood.

When an Object apparently Evil, appears therefore hateful to the Imagination, preſently the Phantaſie fixes on it a Monſtrous and very deformed Image; then ſtirs up all the Spirits, implanted both in the Brain and the Nervous Appendix, into a Deteſtation of this Imaginary Spectre, from hence the Brows are contracted, the Teeth gnaſh together, and the Face is writhed; but eſpecially the *Præcordia*, variouſly open and ſhut themſelves, that they might Eventilate the Blood, by driving in up and down, and Conſerve it free from every Influence or Tincture of this Object.

The Imaginary Evil affects both the Blood, and Spirits.

After this manner, the Paſſions of Love and Hatred are employed about Good and Evil, taken abſolutely, and almoſt Indifferently; or rather about their Idea's: to wit, the Senſitive Soul, beholding the Image of appearing Good, received from the Senſe or the Imagination, and admitting it into it ſelf, preſently ſhe embraces it with a certain ſtrictneſs, as it were with open and infolded Arms, and endeavours to be intimately united to it: But it reſts not long in this fruition; for if this Image of Good be only Imaginary, and being embraced, vaniſhes like a Cloud, taken for *Juno*, the Soul, ſenſible of her Error, quickly lets go her empty Embraces: yea, if that Good were ſolid, after ſome time, its fruition brings forth a loathing, and the Complacency of the Object at firſt amiable, grows cold, by the enjoyment; and it is eſteemed troubleſome. For indeed it is ſo order'd, that we eſteem nothing long in this Life, but being always wanting, whatſoever is obtain'd, we eſteem leſs, ſeeking after new things; wherefore, we are perpetually incited to the deſiring of abſent Good, and to the flying from Evils hanging over us. Love or laſting Charity, is a Divine Paſſion, almoſt proper only to Heaven, as Hatred, ſtanding and endleſs, is an Affection merely Diabolical, and ought to be eſteemed peculiar to Hell. But in moſt Mortals, theſe are preſently changed into Deſires or Averſions; becauſe the deſire of any abſent Good, which we ſeem to want, or the declining of any approaching Evil, obliterate the Idea of any Good or Evil before affixed to the Senſitive Soul, and adhering to it; even as the following waves ſup up the former.

Love and Hate, are tranſitory Paſſions.

Quickly changed into Deſire, and Averſion.

In truth the Senſitive Soul is chiefly employed with Deſires and Averſions; theſe are perpetually ſuggeſted by heaps from our wants, either true or imaginary, and a very infinite Company or Succeſſion of them exiſt. Concerning our Indigencies, from which theſe Paſſions are drawn, it is to be obſerved, that they proceed either from the Senſe, or from Opinion, and ſo peculiar Deſires or Averſions are excited; As to the former, the Animal Spirits in every Senſory, watch as ſo many hungry Gueſts expecting the Approach of an Object congruous to them, as it were food; to the meeting and ſnatching of which, they are often wont to go as it were to meet it, and be carried quite beyond the Confines of their Subject. But that the Spirits reſiding in the Organ of every of the Senſes, do greedily Covet after this manner the ſenſible Object, as their Prey, happens by the mere Inſtinct of Nature, or is procured by Cuſtom: The former is diſcerned, when hunger or thirſt require the Supplies of Meat and Drink, and when the Coldneſs of a naked Body requires Cloathing: Theſe ſort of Deſires, which Neceſſity puts upon Nature, are eaſily ſatisfied, and what are ſufficient for the maintaining of Life, and obtained after this manner; to wit, the Animal Spirits labouring under a defect, in this or that part, do variouſly Contract, and ſo affect with a ſenſe of trouble the Nervous Bodies, in which they flow, which Impreſſion being preſently Communicated to the Brain, it ſtirs up the Spirits inhabiting it into an Appetite or Deſire, and then an inflowing being made into the appropriate Nerves; into a Proſecution of the deſired thing; all this is performed without the Image of the Object, increaſed by the Imagination, alſo without any Perturbation known in the *Præcordia*, or the Blood.

The Soul is chiefly employed by theſe.

Both proceed, either from the Senſe, or Opinion.

The deſire of a ſenſible thing, is excited, either from Natural Inſtinct, or from Cuſtom.

The former is moderate, and eaſily ſatisfied.

Desire got through Custom, despising moderate things aspires to new things.

It is much otherwise concerning sensible Desires got by Custom; for when as a Fruition once happens to the Spirits inhabiting this or that Sensory, of a more pleasant Object, having moderate things in Contempt, afterwards desire the same, and being not long Content therewith, still aspire to others more pleasant; so the Palate being accustomed to more delicate Victuals, loaths every thing unless spiced Aliments, and prepared with most exquisite Sawce: In like manner may be observed, concerning the Smelling, Sight, Hearing, and other Sensitive Functions; to wit, that the Appetite, proper to any of them, (for as much as it once exceeded what sufficed Nature) is always carried to more excellent Objects, and they for the most part only fresh; the reason of this seems to be, that the chief Pleasure of the Sensitive Soul, consists in a more lively Motion, and larger Expansion of the Spirits implanted in every part; but such a Motion of them, depends very much upon the Excellency, also the Variety, and Change of the Objects. For whatsoever moderate or too familiar thing happens to the Spirits, it little affects them; for every motion supposes a Superior, and a Virtue of the Object, somewhat unlike to the Agent; wherefore, when any Object by daily use obtains a Similitude, or Equality with the Spirits, that is less apt to move them: therefore that the Activity, or the lively unfolding of the Spirits (which is the Effectress of Pleasure) may be continued a long time, leaving the Fruition of every old and worn-out Good, it always tends to new and more high things: After this manner, thô every Organ of Sense puts forth Desires, peculiar and proper to themselves, it reiterates them with a perpetual change; but for as much as Objects applied through Corporeal Contact, rather than by Effluvia, affect more vehemently the Sensory; therefore the greatest Company of Desires, arising from the Sense, are wont to be referred to Luxury, or Lust. The Desires of the Spirits dwelling in the other Sensories, for as much as they take only the Species, or the little Bodies, falling off from sensible things, and less thick Embraces; therefore they are more temperate, and are often directed to better uses.

The reason declared, Because the Agent and Patient, ought to be unlike.

The Desires of sensible things, tend chiefly to Luxury or Lust.

Phantastic Desires are immense.

But our wants are chiefly Imaginary, and proceed from Opinion, and from hence a most plentiful Crop of Desires grows up. For indeed, every Man breaths after Felicity, or after a certain Divine State; wherefore, it seeks very much things apparently Good, which are said to Conduce to this State, and endeavours to obtain them; But having followed certain Goods, it finds not the desired Satisfaction in them; therefore it seems to want others, and then again others. So, for as much as Men always tend to the highest Good, or last end, and that he attains it not in his life-time, there is a Necessity of infinite Wishes, and Desires concerning the intermediate Goods: Hence it is, that whatsoever another has, yea, whatsoever of Good the Phantasie can conceive or feign, presently we believe we have need of it, and therefore we desire it, and wish for it. So, though there is an immense Company of Concupiscible things, yet as most Men place their felicity in Riches or Honours, hence the Chief Species of Desires arising from Opinion; and therefore not to be satisfied, are Covetousness and Ambition.

But are chiefly carried to Riches or Honors.

Aversion is excited either from the Sense, or from Opinion.

As to Aversion, this Passion seems only to be the former inversed, and in like manner, to take its Original, either from a certain Defect, perceived by the Sense, or taken from Opinion; for a Sense or Opinion of want, calls to either, a declination of the same manner of State: Wherefore, when the Animal Spirits in the Sensories, are deprived of the Enjoyment of a necessary Good, or of what they were before accustomed to, they either conceive, or set before them the approach of its Contrary, and these being very unquiet, let go the Embraces of every present Object, and set themselves to perform, or enter into a new Confederation; until either the Sense or the Opinion, shall detect some apparent Good, to the desire and following of which, the same Spirits are busied; And so Aversion, being for the most part a Passion of it self Vain, and quickly perishable, terminates in the desire of Good, that may supply the Defect so Carefully shun'd.

This Passion being frail, is soon changed into Desire.

Having shown after this manner for what Causes, and upon what Preparations or fore Occasions, the Sensitive Soul enters into Passions of Desire and Aversion: Let us now see after what manner or ways of Gesticulations or Gestures, she is Composed in either Affection. As to Desires begun from the Organs of the Senses, it is observed, that whil'st the Spirits there implanted, are carried towards the absent Object, all fruition being left, they, as it were naked and destitute of all helps, like Beggars ask an Alms, which as they most greedily desire, as it were about to take by force that Good, they exceed the limits of their Subject; and oftentimes, when the Desire is vehement, almost the whole Soul is drawn into Parties, and by a certain going out from the Body, wanders towards the desired thing, or at least emits a Portion of it self. That it is so, it plainly appears, in that mad affection of Lust, in which the genital Humor, containing Fragments picked from the whole Soul is poured forth. In like manner, in a

Sensible Desire affects both the Spirits and the Blood.

pleasant

pleaſant Sight, Sweet Odor, and moſt pleaſing Harmony, the Animal Spirits, as it were lifted up, role together out of the Senſories towards their Objects: but on the contrary in Averſion, they betake themſelves inward, and ſometimes forſake the Senſories themſelves.

What Alterations Imaginary Deſire brings upon them.

As to deſires excited by reaſon of the Opinion of want, the Senſitive Soul being impatient of a Lot ſo poor, becomes very inſtable and unquiet, all the acquired Goods of its Body, it neglects and diſeſteems, alſo refuſes to hearken to the dictates of Reaſon; yea being altogether precipitate in deſires, ſhe always looks outward, and as it were with wings is ready to fly to this or that apparent Good; hence, by the diſorder of the Spirits, flying hither and thither the Nervous Parts are variouſly diſtracted, and Men betray their deſires by their Countenance, and going; alſo the Breaſt and the *Præcordia* being moved together, the Blood, like the Sea working with the winds, is compelled into various Fluctuations, that thoſe affected ſometimes grow Pale, and ſometimes are overſpread with redneſs; alſo, from the ſame Blood, entring inequally and impetuouſly the Confines of the Brain, ſucceed inconſtancy of Judgment, and frequent Changes of a thing propoſed; as ſometimes they will do this, anon that, as *if ten Minds were together by the Ears in one Man.*

The Fluctuation of the Mind.

Plaut.

Hope and Fear.

According to the aforeſaid Characters or Scheams, the Senſitive Soul is compoſed, about abſent Good and Evil, and not quickly about to come; but when theſe ſeem to be at the Doors, the Soul alters her Poſition, and is reſpectively urged with Hope or Fear: Concerning which, Firſt it is obſerved, that theſe Paſſions do not as the forementioned proceed equally from the Senſe and the Imagination, but are founded only on Opinion; from whence, after entring into the deſire of any thing, the Spirits being Solicitous concerning the following of it, and as it were depreſſed, when they upon ſome other Occaſion, as the Drinking of Wine, are a little elevated with the fruition of another pleaſing Object, and they begin to ſtrengthen Opinion, forthwith doubtful deſire is changed into a certain Confidence, that we hope ſhortly to poſſeſs the deſired Good: In like manner, when as Averſion beholds the abſent Evil a long way off, the depreſſion of the Spirits places it near, and by and by Cauſes a fear of its being about to come upon them. Indeed, Hope and Fear, are very near of Kin to Deſire and Averſion, and either of theſe Symbolical Affections, denote only the more near, or more remote approach of the ſame Object.

Succeed to Deſire, and Averſion.

The Proviſion of Hope.

As to what appertains to the Proviſion and Exerciſe of Hope, when we deſire greatly any abſent Good, and that an Opinion ariſes, that we ſhall ſhortly obtain it, preſently the Animal Spirits, who firſt like Soldiers ſent before, carefully ſeek after, and obſerve the willed thing, forthwith returning towards the Soul, bring News of the Coming of its Gueſt, and prepare a Reception for it; wherefore the whole Soul is preſently brought into an Expectation of its coming; all the Doors of the Senſes are opened, that this Good, with all its Train, might enter thorow open Gates: In the mean time, the Spirits inhabiting every Senſory, are prepared to go forth to ſalute this approaching; the Imagination doth foreſtall its Entrance; to wit, this frames an Idea of the wiſh'd for and coming Good, which it places within its Borders, as in a Throne, and confers on it Adornments and Splendor, borrowed from the Phantaſie. Moreover, the *Præcordia* are Careful for a part of its Reception; for they being actuated with a more full Influx of Spirits, ſend forth the Blood more lively into the Exterior Parts, as it were for the meeting of this new Gueſt; hence, any one being full of Hope, feels in his whole Body, a certain Inflation, with the Spirit and Heat plentifully poured forth: Then, if by any accident, an occaſion of fear or doubting is brought in, preſently a ſudden girding together in the whole, with a certain putting down of the Spirits, and a ſinking of the whole Soul, enſues.

Its Object, both the Senſe, and the Imagination.

Affects both the Spirits and the Blood.

A Character of Fear.

For in the Paſſion of Fear, the Senſitive Soul being firſt ſtretched out, being ſtruck by the nearneſs of the approaching Evil, and being as it were prickt on every ſide, for as much as ſhe conceiving her ſelf taken by the Enemy, cannot fly away into this or that Part, ſhe enters into her ſelf, and that the Animal Spirits may be preſſed together, ſhe is Contracted moſt ſtrictly; if the Affection be vehement, whil'ſt the Animal Spirits ſuddenly go back, from the Superficies of the Body, they greatly bind up at the ſame time the Pores and Paſſages, as it were faſtning the Doors, to ſhut out the Enemy: from this Conſtriction, the Pores of the Skin being drawn inward, oftentimes ſucceeds an erection of the hairs, or the hair ſtanding an end; then the ſame Spirits being acted into Confuſion, they are inhibited from performing the wonted Offices of their Functions, and not only want the helps of Reaſon; but ſometimes the Locomotive Faculties fail, yea by a reſolution or loos'ning of the Nerves, made in the Bowels, oftentimes the Excrements involuntarily flow out. Further, when the Animal Faculty languiſhes ſo much, the Motion of the *Præcordia* is tyred; hence the Blood ſtagnating within the Boſoms of the Heart,

How it Affects the Spirits, and all the Faculties.

How the Blood,

Heart, oftentimes a ſwouning follows: and when therefore it is not carried lively enough into the outward Parts, a Coldneſs and Paleneſs ſucceeds in them. In a ſudden fear, we feel a certain ſtiffneſs, whence 'tis commonly ſaid, that the Blood is curdled in the Body; but this happens, becauſe, whil'ſt the Nervous Parts compaſſing about the Blood-carrying Veſſels, are ſuddenly bound together, they at the ſame time repreſs the Blood from its Excurſion, and ſo ſtop or plainly invert its Circulation.

It often paſſes into Deſperation.

In the mid'ſt of fear, leſt the Spirits being driven too much into flight, the Senſitive Soul ſhould be wholly looſned, Reaſon is wont to interpoſe ſomething of Hope, and ſo by degrees to lift up the dejected Spirits, and to animate them to ſtay, ſo that this Paſſion being alleviated by ſuch a remedy, may more eaſily paſs over; but if by the ſtrong Evil falling on one, all means of Hope be cut off, then a greater Affection, to wit, Deſperation, comes in the place of Fear, in which for the moſt part, this Soul yielding her ſelf overcome, wholly ſinks down, and being half dead, is drowned in her proper Body, as in a Sepulcher, or if ſhe retains any ſtrength, preſently being carried into Confuſion, all things being turned upſide down, ſhe Contracts, Melancholy, or Madneſs.

In like manner Hope into Audacioufneſs.

As Deſperation follows Fear, all helps being cut off; ſo Hope, when it is joyned to more, and more certain, of the ſame, paſſes in Audacioufneſs: And in this Affection, the Senſitive Soul ſwells up, and oppoſes her ſelf dauntleſs to any enſuing Evil; wherefore, the Spirits Guardian, by a more ſtrong Connexion of themſelves, every where extend the Muſcles, and ſtrengthen them, by a more full Inſpiration, to the bearing or reſiſting any thing; hence the Breaſt being inlarged, and then ſtrongly bound together, a bigger Voice is ſent forth; the Fiſts being Contracted, the Arms lifted up, the Head erected, the Face grim and threatning, the Neck ſwollen, and the riſing up, or the ſtretchings forth of other Parts, ſhew the Animal Spirits in the whole Body, unfolded and prepared for Battel, as if about to enter into Conflict: In the mean time, the *Præcordia* being moved moſt ſtrongly, by a more full influx of the ſame Spirits, notably rarifie the Blood, and like Lightning, ſend it forth impetuouſly, and drive it into the outward Parts.

To which Anger is of Kin.

Anger is of ſome Kin to Boldneſs, in which the Senſitive Soul, by reaſon of the Evil unworthily brought to it, at the ſame time is made ſad, and grows hot; wherefore, as ſhe Contracts her ſelf by reaſon of Sadneſs, ſo preſently girding her ſelf for Revenge, ſhe is dilated; therefore, as here divers Contractions come together, this Paſſion is performed with a mighty Perturbation of Spirits, and of the Blood: for thoſe affected, at the beginning wax Pale, by and by they are overſpread with Red; the Forehead is wrinkled, the Lips quiver, the Tongue murmurs, the Countenance is ſometimes caſt down, ſometimes lifted up, and threatning, but the *Præcordia* are eſpecially agitated, with a notable heat and boyling up of the Blood: which kind of Various, and ſometimes Contrary Symptoms, may eaſily be reſolved; to wit, that the Soul at once conceiving Sadneſs and Indignation, like the Sea working with oppoſite winds, has Floods excited from every Coaſt, and ſtriking one againſt another among themſelves.

The character of Anger.

There are more than Eleven Affections.

Beſides the Eleven Affections even now recited and unfolded, according to the Vulgar Opinion, there remains ſome others, excited according to the other manifold Affections and Geſtures of the Corporeal Soul; the chief of which are Pity and Envy, Glory or Boaſting, and Shame; which however are very near related to the afore recited, or are Compoſed out of them. For Pity is made out of Love and Sadneſs, by reaſon of the Evils of a Friend: On the contrary, Envy out of Hatred and Sorrow, by reaſon of the Good things of an Enemy: Glory or Boaſting, is a certain kind of Joy and Exultation, conceived by reaſon of an Opinion of our Good, had from others; and Shame is a certain Sadneſs and Conſternation of the Soul, by reaſon of an Opinion of our ills conceived by others. Further, Concerning this Paſſion 'tis obſervable, that when the Corporeal Soul being abaſhed, is enforced to repreſs its Compaſs, ſhe notwithſtanding being deſirous, as it were to hide this Affection, drives forth outwardly the Blood, and ſtirs up a redneſs in the Cheeks, to wit, the Senſitive part of the Soul, as it were hiding its head, puts before her ſelf a Portion of the Vital or the Bloody Soul, under whoſe wings ſomewhat ſtretched forth, the Confuſion might be hid.

Pity, Envy, Boaſting,

Shame, &c.

A Character of Shame.

Beſides we take notice, that the Corporeal Soul is not only affected by Objects, and their Impreſſions, and compelled into various Geſtures, and the aforeſaid Paſſions; but beſides, ſhe hath certain innate Diſpoſitions, by reaſon of which, by the mere inſtinct of Nature, without any Influence of the Object, ſhe puts forth her ſelf, and is excited into certain Emanations or Spontaneous forces: Of which ſort are firſt an amplification or inlarging the Individual Perſon, and then a Propagation of its Kind. It is Natural for every Animal without example or teaching, to ſeek for, and ſwallow down its food,

Innate Affections.

both

both that the Body may be daily increased to its due Magnitude, and also that the Soul, being daily supplied with a new Store of Spirits, may be co-extended to the Body, and be able lively to perform the Acts of her Functions. Then, as soon as the Lineaments both of the Body and Soul being sufficiently drawn forth, and the Bulk and Compass of either are Compleated; some Animal Spirits flowing over from the work of the Individual, begin to abound, and then being separated into the Genital Parts, with a subtil Humor picked from the whole Body, destinated for the Propagating the Species, as it were in a Store-house, and there layed up, they form there the Idea of a new Animal; which afterward is transferred into a convenient Womb, to be perfectly formed. When the Seeds of a new Animal are so lay'd, the whole Corporeal Soul is drawn with all its Powers into this work of Propagating the Species, more than of the Conserving of the Individual: wherefore the Blood supplies the Testicles, no less than the Brain, with a most subtil and noble Matter for the store of Animal Spirits: and when after too great Expence, the Spirits are deficient in them, that presently the loss may be made up, oftentimes the Brain and Nerves are defrauded of their due Pension, and are suffered to languish, that in the mean time the Blood may pour forth more plentifully spirituous Particles into the Spermatic Vessels. Yea it is thought, that it doth sometimes snatch the Animal Spirits from the Brain it self, which it bestows on the Genitals, in the Act of Venery: For it appears so, when by immoderate Venery, the Brain presently labours with a want of Spirits; for as much as from thence there is no passage for them, to the Spermatick Vessels, but by the Blood; if that the Animal Spirits superabound with a Prolifick Humour, Swelling up within the Genital Parts, presently the whole Corporeal Soul, as it were incited, to the begetting of a young one, is inclined to Concupiscence or Lust: The Incentives of Lust, even against the Mind, are sought for, and they are lay'd hold on, however brought by any Sense; the Blood boils up, the Marrow in the Back grows hot, the Eyes are inflamed, the Genitals are inflated, so that there wants little (unless Reason coming between recalls her, and Prohibits her from the Beastlines of it) but that the whole Corporeal Soul, on every occasion, should be dissolved in Lust. In these kind of Affections of Concupiscence, may be most clearly discerned the distinct Strivings, and contrary Endeavours of two Souls: because, whilst the Corporeal Soul being incited to Lust, inclines her self wholly towards the Genital Members, and Compels thither greater floods of the Blood, and greater store of the Animal Spirits, the Heart and Brain being left wanting of Provision; on the contrary, the Superior Mind, rising up, and shewing the Commands of Reason and Religion, shews a receipt to the other, and Commands that the Animal Spirits return to their tasks, to be performed within the Brain, and also that the raging Blood should be recalled towards the *Præcordia*, and being there suppressed, might be restrained from disorderly Excursions; Hence, the flame of Lust being re-extinct for a time, and the Powers of the Inferior Soul being reduced into Order, the Acts of Sobriety, Prudence, and of other Science, and Discipline may be exercised; but if the reins of Reason be let loose, or new incentives of Lust are brought, the Corporeal Soul, shaking off the yoak, snatches her self again to the like Enormities.

Viz. An Inlargement of the Individual,

A begetting of its Kind.

Venus an Enemy to the Brain and Nerves.

The madness or fury of Lust,

Reason suppresses its flowing.

There remain yet some other Affections of the Corporeal Soul, as Sleep and Watching, Grief and Pleasure, excited in private Members; which, for as much as they respect not the whole Soul at once, but this or that Portion of the Body, or Peculiar Powers of it, and chiefly the Sensitive or Locomotive; therefore we shall handle these anon, and shall next proceed to the Sense and its Kinds.

CHAP. X.

Of the Sense in General.

THe Vital or Flamy part of the Corporeal Soul, being rooted in the Blood, seems not much to know or perceive what things are offer'd outwardly to, or acted inwardly in the Body: So, altho the Blood have life, yet 'tis scarce sensible or knowing, for this which ought to be always employed, with a perpetual Motion, and even inkindling, for the Offices for the sustaining of Life, cannot be at leisure to mind any smaller Matters, or outward Accidents. Indeed great Passions also in some measure disturb the Blood, and pervert and variously drive it from its wonted Course, and like violent Blasts, shake not only

The Blood is animated, but hardly sensible.

only the Leaves or Body of the Tree, but alſo ſometimes pull up the Roots out of the Earth: So whatſoever mutations or alterations happen to the Blood, proceed either from the Complexion of its Liquor being changed, or from the impulſe or incitation of the containing Bodies. But the other Senſitive part of this Soul, which being diffuſed within the Brain and ſtock of Nerves, is Co-extended or equally ſtretched forth with the Organical Body, and almoſt with all its Parts, is affected with every Contact, or with the meeting of other Bodies, ſhe perceives all Impreſſions either outwardly objected, or raiſed up within; and as ſhe is moved by theſe, every where diverſly inflicted, ſhe indues according to the various impulſe of the Objects, various Geſtures and Species in her ſelf, and alſo draws the Members and Parts of the Body it ſelf, with her wholly into the ſame Figures and Motions. For indeed it is the Energie or the Act of the Soul it ſelf, from which every Function of the animated Body primarily and chiefly ariſes. If at any time any Stroke or Impreſſion be inflicted any where to the animated Body, preſently a certain Fluctuation or waving is ſtirred up in the *Hypoſtaſis* of the whole Soul, or of the ſtruck Member; by which, ſome Animal Spirits or ſubtil Particles, ſhut up in the Organical Parts, as a blaſt of Wind in a Machine, being ſtruck, run hither and thither, and ſo produce the Exerciſes of Senſe and Motion in the whole Body, or reſpective Parts.

The lucid part of the Soul feels or perceives the impulſe of all Objects, and is moved by them.

Truly, among the various Geſtures of the Corporeal Soul, by which, ſhe altering her Species or *Hypoſtaſis*, brings a change to the containing Body, the Senſitive and Locomotive Powers obtain the chief place; for as much as they are Common almoſt to all living Creatures, at leaſt to the more perfect, to which alſo all the reſt of the Faculties may eaſily be reduced. Theſe are the chief Advancers of the animated Body, upon which all the other Wheels of this Self-moving Divine Machine depend.

Senſe and Motion, are the chief Advancers of the animated Body.

But the Internal and next efficient Cauſe, both of Senſe and Motion, are the *Hypoſtaſis* of the Senſitive Soul, or the Animal Spirits, inſtilled from the inkindled Blood into the Brain, and from thence diffuſed into the Nervous Stock: which being diſtributed from the Brain, as the Fountain thorow the Nerves to the whole Body. imbue, irradiate, and blow up all the Parts, and bring a certain Tenſity or ſtretching forth to each; ſo that the paſſages of the Nervous Bodies, like Cords ſtretched forth ſtraitly on every ſide, from the Brain and its dependencies, reach forth into all the Exterior Parts, by which, ſo ſtretch'd forth, and actuated by a certain Continuity of the Soul, if one end be ſtruck, preſently the ſtroke is perceived through the whole, ſo that every Intention conceived within the Brain, preſently performs the deſigned work, in every Member or Part; and on the other ſide, every impulſe or ſtroke, which is inflicted from without to any Member, or to the Senſitive Body, is communicated inſtantly to all the Parts within the Head. If that an Impreſſion or force tends from the Brain outwards, thorow the Nerves into the moving Parts, Motion is produced; but if they being made outwardly, are directed inwards towards the Brain, Senſe ariſes. But whil'ſt either of theſe are performed, it is not ſo to be underſtood, (as is commonly aſſerted) as if the ſame Spirits make haſt, and leap back preſently, as it were from one end of the Courſe or Circuit to the other; but as the Soul is ſtretched forth, thorow the whole, with a certain Continuity, its Particles, *viz.* the Spirits contiguous one with another are ſet like an Army in Array; for they after a Military faſhion, whil'ſt they move not from their ſtation, and keep Order, perform their Offices; and whether they be ſet in Battel Array, or on the Watch, they perform the Commands carried outward from the Brain, themſelves being almoſt immoveable, and effect Motion, and deliver preſently to the Brain the news of any ſenſible thing impreſſed, whereby Senſation is made. So indeed, the ſame Animal Spirits, thô with an oppoſite and inverſe tendency, and aſpect of them, cauſe Motion and Senſe: But both Faculties, as to the Exerciſes of their Acts, require ſomething divers Organs; yea, the Animal Spirits planted within the ſame; for the performing the divers Offices of their Faculties, are ordered with a various Affection, and with a different manner of Orders. That each of theſe may be the more clearly illuſtrated, we ſhall firſt of all ſpeak of the Senſe, and of whatſoever belongs to it both in General and in Special, and then afterwards concerning Motion.

The efficient Cauſe of either, are the Animal Spirits.

A moſt ſwift Communication of them, implanted within all the Parts.

An oppoſite tendency of them, effect both Senſe and Motion.

What the Senſe is.

The approach of the ſenſible Object, is made either by Contact, or by Efflurvia's ſent forth, or by reflected and repercuſſed Particles of the Air, Breath, or Light.

The Senſe, as it is taken in a more ſtrict acceptation (*viz.* for the proper Function in animated Bodies, and by which they are diſtinguiſhed from inanimates) is wont to be deſcribed after this manner; *That it is the faculty of perceiving Senſible objects.* Becauſe, the Senſitive ſoul, as hath been ſaid, being apt to be affected or moved by every Contact or Impulſe of an exterior Body, forces its conſtitution to vary in the whole, or in part, according as it is ſtruck: But exterior Bodies, becauſe they conſiſt of Particles, of a various Kind, and diverſly figured, therefore, when ſome are applied to others, their approaches one among another, are not always made after one and the ſame manner, but after a manifold manner, and with notable variety; to wit, either by Corporeal Contacts,

tacts, or by Effluvia's falling from them, or by Particles of Air, Breath, or Light, reflected from them, iſſuing from them on every ſide like Darts. Further, and to every one of theſe Kinds, many Species are attributed: Becauſe, not only Concretes, but alſo various little Bodies of the ſame Subject, ſhew and impreſs manifold Types of their Contacts; ſeveral of which, as they are received and ſo known diſtinctly; by living Creatures, the Senſitive Soul uſing Corporeal Organs, hath many Senſories; fitted for ſuch variety of Objects, and divers repreſentations of things; in which ſeveral, both the Conformation of the Pores, as alſo the diſpoſition of the Animal Spirits, are proportionated to the little Bodies, ſent in from the Object, which are only of one Kind, fitly to be received. By this means ſenſible Impreſſions, at leaſt that may be of uſe to any Animal, are perceived, and from this manifold way of Senſion, proceeds the Knowledge of all things, according to that of the Philoſopher, *All Knowledge is made by the Senſe*; when on the contrary, if Bodies and their Particles, ſhould ſtrike the *Syſtaſis* of the naked Soul, or part of it, always after one and the ſame manner, nothing at all would be known, becauſe one thing or parts, from another, or theſe from thoſe Members, would not be diſtinguiſhed. Wherefore, that all the chief Objects and their Accidents, might be diſtinctly noted, it is ſo provided, that ſome Particles ſtrike this Organ and not that; ſo that they affect their ſeveral reſpective Senſories only, the reſt being untouched.

As theſe ſeveral are made manifold, they require divers Senſories.

All Knowledge from Senſe.

From hence it is clear, that 'tis neceſſary that there ſhould be many Senſories in perfect Animals; which may perform divers Actions, both for the preſerving of Life, and propagating the Kind, and alſo for the knowing many things, and chiefly for the embracing of what things are Congruous to themſelves, and for the ſhunning all incongruous things; for theſe things 'tis needful, that the Senſitive Soul ſhould be affected by the Objects, after a various manner, and ſo perceive their manifold Influencies. How vile their Condition is, and how hard their Lot, that are gifted with the only ſenſe of the Touch, appears from the Life and Operation of the more imperfect Animals, as Oyſters and Lympins; then beſides, how falſe is the Opinion of ſome, who ſay, That every Senſe in all Animals is the feeling only; for althô every Affection is made by Contact, from the Object to the Soul; yet neither is the ſame thing ſtill employed, nor received after the ſame manner; but how many types ſoever of ſenſible things are to be found, ſo many Counterfeits remain in the Senſories.

In Perfect Animals, there ought to be many Senſes.

That one of the Touch or Feeling, ſuffices not.

Nevertheleſs it may here be rightly Quæried, How it may be? for as much as the whole *Hypoſtaſis* or Contexture of the Soul, is made up of moſt ſubtil and alſo moſt highly moveable Particles, that every one of them whereſoever implanted, are not indifferently moved, by every ſenſible ſtroke; when eſpecially the Interior frame of the Soul, which is Common to all the Senſories, receives ths Affections of every one, and ſo is mediately affected by every ſenſible thing: I ſay, why the Spirits implanted in the Eye, do not equally perceive Sounds and Smells, as they do Colours? for as much as they inhabiting the ſtreaked Bodies, diſcern both theſe, and all other ſenſible things.

How the ſame Spirits receive ſenſible Species ſo very divers.

For the reſolving of this Problem, theſe two things are to be ſuppoſed, to wit, firſt, That the Structure of every Senſory is ſo made, according to its Pores and Paſſages, that Particles only proportionate to them may be admitted in: wherefore as Light, and the Images of things, paſs thorow Glaſs, and clear Bodies; not dark Bodies; ſo the ſame are received only by the Eyes, and not by the other Senſories: The ſame Reaſon holds of all the reſt. For we may obſerve, when in the Circumambient Air, or in the Atmoſphere, there are Bodies of a various Nature, and of a divers Configuration, that ſome things affect this, others that Senſory, and ſo the things which are of a ſeveral Kind affect the particular Organ of the Senſe. As for Example, the Particles of moſt thin Air or Light, which ſeem to be of a Sulphureous Nature, being reflected from Bodies, Convey (as was ſaid) their Images into the Organs of the Sight or Seeing; the little Bodies of Air which ſeem to be ſaline, being repercuſſed from Solids, ſhake the Drum of the Ear, by their leaping back; yea, and the ſame being made clammy by a ſweet dew, or moiſtned, affect the taſte; the Particles of the ſame Air, filled with ſweet Exhalations, ſtrike the Noſtrils; And laſtly, The ſame ſtuffed with warm or cold Effluvia's, move the Senſe of Feeling: But in the mean time, the Particles of the ſame Air or Element, which are proportionate to one Senſory, are incommunicable to the reſt.

That this may be done are required,

Firſt a Structure of the Organ after a diverſe manner.

But Secondly, the Animal Spirits themſelves, which reſide in the Organs of the Senſes, and that are like Watchmen, are furniſhed for the reſpective meetings of the Objects, with a certain peculiar Proviſion, and an appropriate manner of Diſpoſition: for when ſome Spirituous Particles, more pure than others, and more ſubtle exiſt, ſome more dull or blunt, others notably moveable, theſe Naked, thoſe ſmered with Humor, and marked with many other Affections; it is ſo provided, that as the Naked Spirits, or thoſe leſs

Secondly, a Various Conſtitution of the Animal Spirits.

gifted ſuffice for the Senſe of Feeling, theſe without any farther indowment are diſpoſed every where in the Membranes, and fibrous Fleſh; but the moſt pure Spirits, and as it were Chryſtalline for the Sight, flow into the Eyes; thoſe that are highly moveable are fitted for the Hearing, and the more Viſcous, which are fuſed with a requiſite Humour, for the Taſte, and Smell.

After what manner Senſion is made.

Theſe things being thus premiſed, concerning the Multiplicity and Difference of the Senſes, and the Organs, we will now inquire into Senſion it ſelf; by what means, and after what manner it is performed. Concerning theſe we thus ſay in general, that the Object being applied to the Senſory, (whether it be done immediately, or the Particles of the Air or Element coming between) doth impreſs its Idea or Character on the Spirits implanted in that place; and in the ſame inſtant, by a continued Series of the Animal Spirits, as it were an Irradiation, the Type of its Impreſſion doth paſs from the Senſory to the Head; and whil'ſt the Spirits actuating the ſtreaked Bodies, are in like manner affected by it, a perception of Senſe, begun from the Organ, is formed.

All ſenſible Impreſſions do beam forth from all the Organs, into the ſtreaked Bodies.

That Sight is ſo performed, Dioptrick Experiments do plainly ſhew, by which, the ſame Species of any Body, by a Glaſs artificially placed, may be Carried or Reflected hither or thither, and may be figured and beheld at once in ſeveral places: why in like manner, may we not Conceive the Image of the Object repreſented in the Eye, as in a Glaſs, to propagate its likeneſs from thence further to the ſtreaked Bodies? But as to the other Senſories the Buſineſs ſeems more hard to be unfolded, becauſe the ſenſible Species, for as much as they are more Corporeal or thicker, cannot be conveyed to the Head with ſo quick a paſſage, and almoſt unperceiveable like Lightning; but as to theſe, it is to be underſtood, that althô the Smell, Touch, and Taſte, require more near and more Corporeal approaches of the Object, than either the Sight or Hearing; yet the Animal Spirits, which as it were *internuncii*, are placed within every Organ, and the chief Senſory, equally and as eaſily tranſmit the ſtroke or impulſe of every Kind; Becauſe as the Spirits are diffuſed thorow the whole Nervous Syſtem, and thorow the Head it ſelf, as it were with a continued beaming, every Impreſſion by the ſtroke of the Eye gets ſooner from one bound to the other; yet the Character of the Object, is conveyed by the like Motion of their Neighbors, and as it were by a certain waving, even to the ſtreaked Bodies.

In every Senſion is required, Firſt, That the Species be impreſſed on the Senſory. Secondly, That it be carried thence, by the paſſage of the Spirits to the Common Senſory.

Hence it follows, that for the Act of Senſion, theſe two things are required. Firſt, That the ſenſible Species be expreſſed, ſo as it may be impreſſed on the Senſory: And Secondly, That the Idea of the ſame Impreſſion, be carried thence, by a like Affection and Motion, by the Spirits flowing in the intermediate paſſages, to the Common Senſory; for otherwiſe Senſion is not performed, as it appears, when being intent on other things, we take not any notice of any Objects, thô they approach near to the Eyes, or the other Organs.

How the divers ſenſible Species are diſtinctly repreſented, in the ſame Common Senſory.

But here we may have a Cauſe of Doubting, how the manifold Species of ſenſible things, for the receiving of which, many Organs, and thoſe diverſly framed, are required; do all come together within, and are diſcerned in the ſame Common Senſory; For it is a wonderful thing, that the ſame ſtreaked Body, conſiſting of a make not much unlike, ſhould admit, and know diſtinctly in it ſelf, the univerſal Idea's of Objects. As to this we may ſay, that the Images of things to be perceived by the Senſe, are not diſtinctly painted in the Common Senſory, as on a Table; but every Impreſſion there ſhown, depends on the Motion, as it were by a certain waving, of ſome Spirits ſeparate from others, and within theſe or thoſe peculiar Tracts of them: Nor is it irrational to affirm, that ſome Spiritual Particles are moved within the *Hypoſtaſis* of the Senſitive Soul, and her the ſame Portion of it, whil'ſt others lye quiet, lying between them; for it plainly appears, and which afterwards is more largely ſhown, that within the Body of the Air, the lucid Particles are agitated, whil'ſt the reſt lye at eaſe; yea alſo, that Sonorifick, yea and odorous little Bodies, and perhaps many others of another Kind, are moved by a diſtinct and peculiar Agitation apart by themſelves, from the other texture of the Air; for both Images paſs thorow, Sounds are poured out, Odors flow, warm or cold Effluvia's, and other little Bodies are variouſly carried; yet notwithſtanding, others in the mean time are neither driven by force by ſome others, nor is the Conſiſtency of the whole Air diſturbed by ſome Singulars. Yea, various Impreſſions, not only paſs thorow the Air unchanged, but alſo the Superficies of the Water; for we have obſerved in a River, or a Fiſh-pond, when many wavings have been ſtirr'd up, by various and divers ſtrokes together, that all of them, however they meet one another, paſs thorow, or cut one another, continue ſtill diſtinct, and inconfuſed; why then may we not ſuppoſe, that in the Airy *Syſtaſis* of the Soul, (which alſo is founded in a Watry Humor) there are Particles of a various and unlike make, and that manifold Species, by

It is ſhown by an example of the Air, whoſe divers Particles have divers carryings forth.

Alſo by the example of Water, in which, many wavings being at once made, are all diſtinct.

their

their paſſing thorow, may be at once brought to the Common Senſory, without Confuſion? As for Example, Suppoſe that for ſeeing moſt Subtil and as it were Ætherial Particles, others almoſt Saline and notably moveable for the Hearing, and ſo for the other Senſes, Spirits endowed after this or that manner, to be interwoven together, and every peculiar Senſion to be produced, by a particular affection of them; to which it happens, that for the various paſſing thorow of the Spirits of ſo diverſe a Nature, divers Tracts or Paths are produced, both in the Organ it ſelf, and in the Common Senſory: and ſo, when the Animal Spirits are affected, which are of this or that Nature apart from others, which are of another Nature, and as there are beamings forth of ſeveral kinds, as it were within various Inlets or Paſſages; 'tis no wonder, if in divers Organs, diſtinct Acts of Senſions are performed; and that all of them, however different in Kind, and coming together from many ways, are ſhewn within the ſame Common Senſory, to wit, the ſtreaked Bodies; becauſe in this Marrowy Part, Spirits of every kind abound, and alſo paſſages of every ſort of Conformation are found; therefore, every Impreſſion impreſſed on any Organ from without, may be diſtinctly repreſented in this ſame Body. That it is ſo, it more clearly appears from hence; becauſe both the ſtreaked Bodies, and the way leading to theſe, conſiſt of many white Ligatures; which ſeem as ſo many ſoft Nerves, or marrowy Tracts, for the divers ways of receiving the Impreſſions of ſenſible Species.

The like is in the Airy Hypoſtaſis of the Corporeal Soul.

For the divers Perceptions of which, together, in the Common Senſory, there are many and diſtinct Tracts produced.

When a ſenſible Impreſſion is brought through the Animal Spirits, being affected by a continued Series, from the Organ to the Common Senſory, if it be light it is there terminated, and the perception of the External Senſe quickly vaniſhes, without any other Affection; but if (which more often happens) the impulſe of the Object be ſtronger, the Senſe excited from thence, like the vehement waving of waters in a Whirl-pool, both partly paſſes thorow the ſtreaked Bodies, and going forward to the Callous Body, it oftentimes raiſes up two other Internal Senſes, to wit, the Imagination and Memory, either one or both of them; and alſo is partly reflected from them, and from thence, by a declining of the Spirits, leaping into the Nerves, local Motions are made.

Senſible Impreſſions, as they are ſtrong or weak, ſtir up other Powers, either more or fewer.

For indeed Impreſſions of ſenſible things, from the beginning, furniſh both the Imagination, with the Memory and Appetite, and induce the firſt attempts of local Motions. It is firſt effected, for as much as the ſenſible Impulſe, is often propagated beyond the ſtreaked Body, into the marrowy part of the Brain, or the *Cortex*, or the extream Confines of it. But local Motions ordinarily ſucceed to Senſion, for as much as the Animal Spirits being ſtruck back from the bolt or ſtay of the ſtreaked Bodies, ſpring up outwardly, and as they enter theſe or thoſe Nerves, by a certain Conſequence, or by chance, they excite fortuitous local Motions, or depending on the previous Senſe; for in the reciprocal exerciſe of theſe Faculties, to wit, of Senſe and local Motion, (before Animals are imbued with Phantaſie and Memory) almoſt the whole Animal Function conſiſts; becauſe Brutes or Men, whil'ſt they as yet know not things, want Spontaneous Appetite. So long therefore, they being deſtitute of the Internal Principle of Motion, move themſelves or Members, only as they are excited from the impulſe of the External Object, and ſo Senſion preceding Motion, is in ſome manner the Cauſe of it.

All the other Powers of the Soul proceed at firſt from Senſion.

Therefore in every Senſion, the Animal Spirits are moved; and their Motion being excited, in the utmoſt Senſory, from the approach of the Object, and harmoniſed according to its Impreſſion, turns inwards, and (as hath been ſaid) is conveyed to the firſt or Common Senſory: wherefore it is not to be thought, that the little Body's ſent from the Object, do penetrate deeply, and enter the inward parts of the Brain it ſelf (as ſome have aſſerted); but it ſuffices, that they being caſt forth like Darts from the ſenſible thing, do affect the Spirits placed in the fore-front; and then, they from thence moſt ſwiftly paſs thorow, by their Irradiation, the impreſſed Motion. As to the Parts, within which the Animal Spirits dwelling, do carry thorow, as it were by Pipes and Dioptrick Glaſſes, the impreſſed Species of ſenſible things; they are the Fibres, Nerves, and the Oblong Marrow, and chiefly the tops of it, to wit, the ſtreaked Bodies. The Fibres being ſtretched forth in every Senſory, as it were Nets ſpread abroad, take the Particles of the Object, diffuſed and entring here and there, from which, whil'ſt the Spirits implanted in thoſe Fibres, are affected, and are marked with the type or ſhaddow of the Objected thing, forthwith the ſame Character being expreſſed, by a continued Series of Spirits, paſſes forward, thorow the little Pipes of the Nerves, and the Medullary Trunk, into the ſtreaked Bodies, and is there repreſented as upon a white wall; But the Rational Soul, eaſily beholds the Image of the thing there painted; or perhaps carried forward beyond into the Callous Body, the Imagination and Phantaſie being excited, But after what manner Brutes perceive themſelves to feel, and by reaſon of that Senſion, they either imprint it in their Memory, or draw forth the Acts of the Appetite, we have ſhewn elſewhere.

The Animal Spirits paſs thorow the ſenſible Species; and not the Effluvia of the Object, penetrate even to the head.

The bounds and paſſages, by which, and into which the Species paſs thorow.

The Number of the Senſes is well affirmed to be Five.

Concerning the number of the outward Senſes, we ſhall not recede from the vulgar Opinion, affirming them to be Five; for althô in ſome imperfect Animals, perhaps one Senſe or two are only found; and thô it may ſeem, that the more perfect living Creatures may exerciſe many more than Five; becauſe it is poſſible, that the Kinds of ſenſible things, far exceed that Number; yet it is ſeen, that thoſe Five Organs of the Senſes do abundantly enough ſupply the wants of all living Creatures: at leaſt it ſeems good to the great Creator, not to grant to Man more than theſe, nor perhaps better than brute Beaſts have obtained: Hence we may argue, that whereas the firſt Notions of all Simple things, are acquired only by the ſhowing of the Senſe, and that Man, notwithſtanding, is wont from thence to form Complicated Orations and Diſcourſes, beyond what Brutes are able to do, that this is done by the Virtue and Operation of the Rational Soul in him, of which indeed Beaſts are wholly deſtitute.

So many, and not more, are requiſite.

As to the Order or Method, by which we ſhould treat of the Senſes, particularly to be conſider'd, if their worth or dignity be reſpected, it is confeſſed by all, that Seeing, and then Hearing ſhould by right have the Prerogative; but indeed, becauſe Knowledge more eaſily, and always more happily, proceeds from more Known things, to things leſs Known; therefore, I think to begin with the Touch or Feeling, as the moſt Common Senſe; alſo for that the formal Reaſon of which ſeems to be moſt eaſily unfolded.

CHAP. XI.

Of the Senſes in Particular, and firſt of the touch or Feeling.

The Senſe of Feeling is more thick, but the moſt ample or large.

THE Touch or Feeling, thô it ſeems a Faculty of a lower Order, and as it were of a more groſs Nature, becauſe it apprehends not the object, unleſs it be brought near, and as it were preſſed with its Arms; yet in ſome reſpect, it is more excellent by far than the reſt; becauſe this Senſe beyond all others, receives and knows the Impreſſions of many ſenſible things, and thoſe inflicted with greater variety; and ſo obtains a moſt large, and as it were a general Province. For ſince that the Senſible Qualities ſo called, are manifold and divers, to wit, Heat and Cold, Moiſture and Dryneſs, Hardneſs, and Softneſs, and other Modifications of Bodies, their Make, Motions, Influences and Types, or Figures of Appearance, which in Concretes reſult from the mixtures and divorces, or the various Tranſpoſitions of the Elements, the greateſt part of them by much, are the proper Objects of Feeling, and are diſcerned only by its Judgment, and as it were by its Will. Further 'tis obſerv'd, That the Touch or Feeling, gives notes of Judgment to all the other Senſes concerning uncertain Objects: for when the Sight cannot diſtinguiſh a Ghoſt or Spectre, from a ſolid Body, by the tryal of Feeling, preſently the thing is put out of doubt; ſo likewiſe of the Smelling and Taſte, which oftentimes put away ſenſible things brought to them, and fear their near Embrace, unleſs firſt tryed by handling.

Exhibits Signs of Judgment to the reſt of the Senſes.

It hath a mighty diffuſive Senſory or Organ.

But this Power, as it enjoys great variety, as to its Objects, ſo it hath a moſt ample Senſory, and equally extended almoſt with the whole Body; That indeed few Parts, either within or without, but partake of this Senſe. Further, this Faculty, for that 'tis of a general and common uſe, inſinuates it ſelf into the Organs of the other Senſes, deſtinated to the private Office of every one: For both the Tongue and Noſtrils, alſo the Eyes and Ears, perceive heat and cold, hardneſs and Softneſs, and other tangible qualities, no leſs than their proper Objects. If that we ſhould further inquire, what the immediate Organ of Feeling is, in the ſeveral Members, or Parts? it may be ſaid, that it is the Nervous Fibres, every where ſtuffed, and as it were diſtended with a Company of Animal Spirits; which as the Strings of a Lute, as often as they are ſtruck by the ſtrokes of Tangible things, propagate the Impulſe every where received, by the paſſages of the Nerves, forthwith to the Common Senſory. For as ſuch Fibres being thickly ſet, are interwoven in the Skin, the fleſhly Pannicle, the Membranes, and Muſculous Fleſh, yea, and with ſome of the Inwards, ſo that the Approaches of outward Tangible things, are not only felt in the Palm of the Hand, or the Superficies of the Body, but as often as ſharp Humors are brought within into the Bowels, or that Preternatural Contents cauſe a pulling or hawling; a troubleſome Senſe of it is felt; wherefore the proper Organ of Feeling, is neither the Skin, nor the Fleſh, nor the Membranes, as hath been aſſerted after this manner by ſome, and after that manner by others; but the

Which are the Nervous Fibres.

In all the Parts, both External and Internal.

Fibres

Fibres are that Organ, implanted in the whole frame or make of theſe or thoſe Parts.

Althô many ſenſible Fibres are placed every where thorow the whole Body, alſo, thô there are divers and manifold Tangible qualities; yet it is not to be thought that theſe Fibres, that they may be the better fitted for thoſe qualities, are of a different Kind or Conformation; for neither are there ſome Fibres, by which heat, or others by which cold, or others different from either, by which other Tangible things are perceived; but the ſame Fibres, are every where alike, and receive and diſtinctly carry the approaches of every Object, for neither do the ſenſible Fibres, planted in divers places or parts, acquire a diverſity of Office, ſo that one Member ſhould be the Index of heat, another of cold, or another of a ſeveral Tangible thing, but every one indifferently feel almoſt all Tangible things, from every Fibrous Part. The reaſon of the difference is, becauſe the Fibres, thô of the ſame nature and frame, enter into divers ways of Contractions or wrinklings, from the various ſtrokes of ſenſible things; even as the ſtrings of an Harp, from the various ſtrokes of the Muſitian, give forth different Sounds; ſo alſo, the Fibres, which are the Inſtruments of Touching, are affected after a different manner, by the various impulſe of Tangible things. For it ſeems, that theſe are irritated or provoked one way, with heat, and another way with cold, and ſo from the reſt of the Qualities, after a manifold manner; therefore, the Animal Spirits implanted in them, enter into a peculiar way of Gyration or turning round, or of undulation or waving, according to which, the Spirits being harmonized, which flow within the paſſage of the Nerve belonging to thoſe Fibres, do propagate the ſame Figure or Type of their carrying forth, to the Medullary Stock, and by its means, to the Common Senſory.

Which Fibres, thô every where of the ſame Conformation;

Yet Exhibit various Species, according to the various approaches of tangible things.

The Tangible Species being impreſſed after this manner, on the Nervous Fibres, or the outward Organ of the Touch, are not always carried from thence, or at leaſt not immediately to the ſame Common Senſory; for we have ſhewed elſewhere, that ſome Nerves ſpring from the Parts of the Brain, and others from thoſe of the Cerebel; wherefore, when they direct the Impulſe, hap'ning outwardly immediately to the ſtriated or ſtreaked Bodies, theſe latter convey the Senſion from the Fibres, which are planted ſomewhere more inwards about the *Viſcera* to the Cerebel; from which (without Knowledge of the Animal) oftentimes involuntary Motions are retorted: as when Vomiting follows upon an Emetick Medicine, unknown, and againſt our Minds. If that this private Senſion belonging to the Cerebel be a little ſtronger, and vehement paſſing thorow the ſame Cerebel, goes further even to the ſtreaked Bodies; as when Medicines provoking the Stomach, more ſharply, induce a Senſion or trouble about the Heart, or otherways moleſtious, which they plainly give notice of.

Tangible Species immediately carried either to the Cerebel, or to the ſtreaked Bodies.

Further, when the Tangible Impreſſion arrives firſt and immediately at the ſtreaked Bodies, if the ſame be light, it is there terminated, and the ſenſible Species preſently vaniſhes; but if the Impulſe of the Object be ſomewhat ſtronger, it paſſes further to the Callous Body, and oftentimes to the Shell of the Brain; and therefore their Affections, Imagination, and ſometimes Memory, gather'd from the touch of the thing, ſucceed: and when, the ſenſible Species being alſo dilated to the Common Senſory, a divergency or bending down of the Spirits, from thence is reflected into the ſame Nerve, or others related to it, ſo it ſtirs up local Motions. Theſe ſort of Effects are ſufficiently known by the Common Proverb, *Where the Pain is, there the Finger will be*: for it is implanted by Nature in every Animal, to rub or preſs the place with its finger or foot, where any ſenſe of Trouble or Pain is.

And from thence goes forward, ſometimes to the other Faculties, Viz. the Imagination, Memory, and Appetite.

As to the Kinds and Differences of Feeling, both are taken, either from the Objects, or from the various affection of the Senſory: the ways or means of the former, are ſo manifold, that they cannot eaſily be recounted; for hither ought to be referred (as we ſaid but now) the univerſal Tangible Qualities; By Tangible Qualities we underſtand here, the various habitudes of Natural Bodies, which ariſe from the Craſis and Diſpoſition of the Elements, of which they are made; as alſo from their Inteſtine Motion, or Effluvia's variouſly appearing in themſelves; which kind of Modifications of Bodies, the Senſe of Feeling chiefly finds out, and makes their knowledge or marks ſo certain, that when we do not believe the Scrutiny of the other Senſes, we are wont to reſt ſatisfied with the Examination of this.

The Kinds and Differences of Feeling, are either,
In reſpect of the Object;

Concerning the Species of Feeling, Conſtituted in reſpect of the Senſory, we ſhewed even now, that the ſenſible Impreſſion was immediately derived from the External Organ, either to the ſtreaked Bodies, or to the Cerebel: Therefore, for that Reaſon, Senſion is either manifeſt, and knows plainly every thing; or private of which the Animal is ſcarce knowing: but the Conſequence declares this Kind of Senſion to have been ſtirred up: for a Motion being made in any inward unſeen, argues a previous ſenſe of it to have

In reſpect of the Senſory.

And ſo it is either manifeſt or private.

have been; as from the change of the Pulse, or a failure of Spirits, shews a certain Malignity to have affected the *Præcordia*, or the Cerebel.

Pleasant or Sad.

In either of the aforesaid Kinds of Sension, to wit, whether the same be manifest or private, the Tangible Impression, either coming pleasantly to the Fibres, gathers together the Spirits implanted in them, and more nearly delights them, and strokes them with a soft and gentle rubbing, whence pleasure arises; or the Impulse of the same, pulling and wrinkling the Fibres, distracts and dissipates the Spirits one from another, and so Grief, Pain, or Trouble Succeeds: But concerning these Affections, *viz.* Grief and Pleasure, we shall have hereafter a more fit place to speak of them; so that it next remains, for us to proceed, from the Sense of Feeling, to its nearest Neighbor and Relation the Taste.

CHAP. XII.

Of the Taste.

The Taste a Kin to Feeling.

THe Taste is so like to the Sense of Feeling, that it seems to be a certain Species of it; and certainly the Object, in either Organ, ought to be brought near, and laid upon it; yea in tasting, to be admitted more deeply within the Pores and its passages. Upon this Sense, depends chiefly both the Life and Vegetation of Animals; for this chooses and takes in Juice for nourishment convenient, and that by this Office it might be constantly and rightly performed, it is furnished with a faculty, or a certain implanted Judgment, whereby some wholesome and agreeable Aliments, fit for every Individual, are discerned from those that are disagreeable and hurtful; also further, as it were in reward of its work, it is delighted after a notable manner, with the Exercise of its Function; For unless convenient agreeable things, fit to be Eaten, move Spittle, and as it were prickle them with a most grateful pleasantness of Taste, the appetite of desiring or taking of Food is quickly extinguished, with oblivion or tediousness; so for the preserving the Individual, no less than the Species, Desire and Pleasure ought to be had.

The Sensory of the Tast discerns its Objects, and is delighted with those things that are Convenient.

Venus or Pleasure is necessary for the preserving of the Individual.

The Sensory of the Taste is not so diffusive, and almost Co-extended with the whole Body, as that of Feeling, but is limitted to one part only: yea, and its Sensible is of one Kind only, to wit, a Savoury thing, nor does it include, as the Tangible Quality, the Subjects of many Catagorical things. Indeed the chief and almost only Organ of the Taste is the Tongue; to which, after a manner, but obscurely, do consent the Palate and the Upper part of the Throat; But in all of them, the Nervous Fibres are the immediate Instruments of Sension; wherefore 'tis observed, that the Tongue is notedly more Fibrous than any other part, also consists of a very porous Contexture; for this end, that the savory Particles of the thing, might be more plentifully, and more deeply admitted, into the passages of the Sensory, and so meeting at once with many Fibres, might excite a more acute Sension: yea, it may be suspected, that whil'st the subtil Particles of the savory Humor are imbibed so deeply by the Tongue, the Animal Spirits do in some measure snatch the same, for their nourishment, and convey them inwardly, by the passages of the Nerves, towards the Brain; for it plainly appears, that in great Fastings or want of Food, and swouning or failure of Spirits, that a refreshment of them immediately follows, upon the first tasting of any noble Liquor.

The Organ of the Taste, is the Tongue, with the Palate, and Throat.

Eating is a certain Solution;

Wherefore one savour, oftentimes excludes another.

Eating is a certain Kind of Solution, whereby the savory Particles may be the better taken in, from the Food by the Sensory: Because, whil'st solid eatable things are reduced into bits, by Chawing, the Tongue, and other parts of the Mouth, and Throat, pour forth as it were a certain Menstruum, which washing and as it were Elixivating the savory little Bodies, carries them into the Sensory, and insinuates them into the Pores of the Tongue: Further, The savory Particles, because so impacted in the Sensory, do employ its passages, hence it comes to pass, that one savour not rarely excludes another; so sweet things being tasted, because they are clammy, and very obstructing, hinder or pervert the more exact taste of Wine; wherefore, that the hindred Faculty might be again restored, salt or sharp things are eaten, which may open the Pores of the Tongue, and clear away the sticking Viscousness.

As

As to the Nerves, which serve to the Fibres of the Tongue, thickly interwoven with it, and which carry the Impressions of Savours, to the chief Sensory, it seems, that they are of a double Kind: for as Nerves are inserted in the Tongue from both the Fifth, and the Ninth pair, and are every where distributed thorow its whole frame, with a most thick Series of shoots, it is very likely, that they are both Sensitive. Concerning the Nerves sent hither from the Fifth pair, the thing is out of doubt; and as from the same pair, other shoots are sent into the Nostrils, hence we may say, the reason is, of that Consent, which is between both these Sensories; but indeed, as to the Nerves bestowed also on the Tongue, from the Ninth pair, it may be something doubted, because it is commonly believed, that the Office of these serve to the Motion of the Tongue, and to Speech; wherefore, from the same pair are sent certain branches into the Muscles of the Tongue, and of the Bone called *Hyoides*, which without doubt are destinated for their Motion: Nevertheless, thô it be granted, that the Nerves of the Tongue and its Appendix, inserted from the Ninth pair, do bestow on them the moving Power (which indeed is necessary to this Part, as well for Tasting as for speaking; to wit, as the Tongue is very versatile, it takes in with delight the Savours from every corner or recess of the Mouth) yet what hinders, that however the same Nerves should not serve for both, to wit, Motion and Sense? For it appears, that many Nerves which serve for the Sense of Feeling, do in like manner serve for the performing of the Motions of those Parts to which they belong. Wherefore, as Tasting is a certain Species of Feeling, it is probable, that it enters in some measure through the moving Nerves of the Tongue it self; neither does it appear otherwayes, for what end Branches of the Nerves, derived from the Ninth pair into the Tongue, disperse such thick-set shoots into its whole frame, unless they should serve for the receiving of the Particles of Savours, coming from every Part. But for as much as after this manner, two Nerves of a distinct Original belong to the Tongue, and one of them arises from the Parts of the Brain, and the other from the Cerebel: Hence a Sension being carried inwards by the same, it is stay'd from either at the Common Sensory, and so according to the diverse Nature of the Object, a pleasant and delectable fruition, or an ingrateful and sad Aversion, at once in either Government the Imagination and the *Præcordia* are affected.

The Nerves sent to the Organs of the Taste, proceed partly from the Fifth pair.

Partly from the Ninth also, which serve for the Motions of the Tongue.

It is in like manner observed of the Touch, that the same Nerves serve both for Sense, and Motion.

Wherefore from the Taste of a pleasant thing, the Imagination and the Præcordia, are wont to be affected.

There is a sufficient indulgement to the Taste, for a reward of its necessary work, to wit, Eating; therefore its Objects are sought far and near, through the Regions of the whole World, yea and all the Elements are imployed. Further, as to its Ministry, all the rest of the Senses serve to this, for nothing pleases the Palate unless the Sight, and Hearing, Smell, and Touch approve it. 'Tis fit it should be so, for this Sensory, by which Food is conveyed for Humane Life, and that it might enjoy great variety, for the shunning of nauseous things; and use a guard upon the rest, for Discrimination; lest instead of Food, it might unawares take Poison.

The rest of the Senses, wait upon the Taste.

The Speculation of Savours, (which are the next Object of Taste) contains in it self very many Pleasant, and no less Profitable things; wherefore I think it will not be from the Matter, to turn aside here a little into this Theory; and as we shall divide all Savours into Simple and Compound: First, we shall rehearse what Nature suggests of that Kind particularly, according to their several differences, both of themselves, and of the Subjects in which they are; Then Secondly, we shall add the Parallels, by what means, and by what service of Art, the same Savours in Subjects are produced anew, in which they are not by Nature; Thirdly, After what manner Savours both Natural and Artificial, are any way altered and changed in their Subjects, or wholly perish. It will be worth our while to discourse briefly concerning these, and lastly, somewhat of Compounded Savours.

Savours the Object of Tasting. Simple or Compound: A threefold Consideration of them, to wit, which are,
1. Whose Original are natural.
2. Artificial.
3. The Alteration or Abolition of either.

Savours called Simple, are commonly counted to be Nine, *viz.* Sharp, Bitter, Salt, Acid or Tart, Astringent or Biting, Sowre, Sweet, Oyly, insipid or without Taste.

Nine Simple Savours.

The first is sharp or biting Savour, such as is felt in Pepper or Pellitory, being chewed; which probably arises, as often as the Particles of any Body are smooth, and sharpned, and after that manner figured, like the stings of Nettles, that they may prick and very much dig into the Sensory. In Subjects indued with a sharp biting Savour, a volatile Salt, or an Alchalisat, or suffering a Flux from Fire, very much exceeds other Elements.

Sharp Savour.

First, Concretes, which have by Nature Particles so figured, are accounted among Vegetables Hearts-ease, or Trinity-Herb, Pepper, Aron, Country-Mustard, Sea-Lettice, or Milk-thistle, Mustardseed, Pellitory, Ranunculus, *&c.* Of Minerals Arsneck, Sandarach, *&c.* Among Animals it is scarcely met with, nor among their Parts, a savour of this Kind, unless perhaps some Insects, as Cantharides, *&c.*

1. Which are sharp or biting of their own Nature.

Secondly, Sharp biting Bodies produced by the help of Art, are Mercury Sublimate, Butter of Antimony, Strong-Waters, and Causticks, the fixed Salts of Herbs, made by burning to Ashes, Calcined Vitriol, the Rust of Brass, *&c.* The oftner things suffer Calci-

2. Which are so produced by Art.

Calcination, and Fusion in the Fire, the more biting sharp they are made; because, by this means, the Pricks and Spears of the Particles are sharpned. An Example is in the fixed Salts of Herbs, calcined Vitriol, the Infernal Stone, *&c.* Bodies which are biting sharp, and Corrosives mixt together, and committed to the Fire, acquire a most sharp force of burning. An example is in Mercury Sublimate, and Stygian Waters, the reason of which is, because Salts of a like Kind, being mixed together, joyn their forces or edges, and are at the same time very much sharp'ned by the fire. It happens otherwise to Salts of a divers Kind, as are Spirits of Vitriol, and Salt of Tartar, mixed together; Sugar and Honey subjected to distillation, exhale a Caustick Water; also the Spirit of Wine highly rectified becomes biting sharp, and burning; because the Saline or Spirituous Particles, in both Substances being deprived of the sweetness of the others, put forth their Spears and Pricks.

3 By what means the biting sharpness is wont to be taken away, or altered.

Thirdly, Which was the Third Proposition, the biting sharpness in Bodies, both Natural and Artificial is put away or altered after various wayes. *Mercury* Sublimate highly Corrosive, if another quantity of live *Mercury* be added and sublimed, it takes away all acritude or biting sharpness, and it becomes insipid or without taste. The reason of which is, that when the Particles of the added *Mercury*, do grow to the little Spears of the Salts, they do thereby become more thick and obtuse. The Spirit of *Vitriol* and Salt of *Tartar*, being melted (which two are biting sharp and corrosive of themselves apart) if they be put together, lose all acritude; to wit, these Salts being of a divers Kind, *viz.* Fluid and Alchalisat; being put together, work mutually one upon another, by which means, the little Spears and Pricks of both are broken; even as if the edge of one Knife, should be rubbed against the edge of another. Plants and Herbs, which are naturally biting sharp, if they be macerated in White-wine, (or perhaps in any other Liquor) put away all their sharpness; and yet the Liquor becomes not at all sharp. In these sort of Concretes, all the acritude depends upon the volatile Salt, which being loosned, by the mixture, presently flyes away. For the same Reason, these sort of Herbs, being subjected to distillation, exhale almost an insipid water, and the dreggs of the Herbs remaining after distillation, is also insipid: Hence also some Herbs, which being green, abound with a sharp biting juice, being dryed, lose very much of their acritude; as Scurvy-grass, Water-cresses, and Brooklime, *&c.*

2. Bitter Savour.

Secondly, The bitter Savour or Taste, such as is principally in Gall and Wormwood, seems to be made, for as much as the Particles of its Body are planted with forked Pricks, which digging into the Sensory, not deeply, but only on the Superficies, cause a sad or sorrowful Sense; just as if the sharp-pointed fruit of the Teasle, should be sharply handled with ones hands. In Subjects indued with a bitter Savour, Salt, associated with Sulphur, and suffering an Adustion with it, Predominates.

1. Which are bitter of their own Nature.

First, Subjects which exhibit this kind of Savour naturally, among Vegetables, are Wormwood, Southernwood, Centaury, Colocynthida, Agaric, Fumitary, and almost all Herbs which grow in dry and mountany places; then Gumms, and Concrete juices, as Myrrh, Aloes, Opium, Ammoniac, *&c.* Among Minerals they are not easily met with. The Excrements of living Creatures, as the Gall, and Dung, the Liquor contained in the Bladder of the Gall; and so the Skins of some Birds are bitter.

2. After what manner, the bitterness may be produced anew.

Secondly, As to the second, Things which draw bitterness anew, they are Compounded Liquors; if in Cooking they are burnt, or are made too thick by Evaporation; hence Soot is bitter, and whatever things suffer adustion or burning. Sugared Aliments and sweet things are most easily Corrupted in the Stomach, and degenerate into a most highly bitter Humor.

3 By what means it is wont to be taken away, or altered.

Thirdly, As to the Third; a bitter Savour is most difficultly taken away, without the Destruction of the Subject, in which it is; as appears in Aloes, and Colocynthida, and Medicines prepared out of them. Yet New Beer, being something bitterish, by the boyling of Hops in it, grows sweet by clearing and a long fermentation: the reason of this we have shewed elsewhere. Further, Liquors, which grow bitter by reason of their Contracting an *Empyreuma* or burning to, if they be exposed for a long while in a moist Air, or distilled over again, mixed with Calcined Salt, they will partly lose their *Empyreuma*, or smatch of Fire, and bitterness.

3. Salt Savour.

3. Because Experience shews, that Salts for the most part do grow together, into many pointed, and diversly corner'd Figures, it is most likely, that the Salt savour is produced, when Particles of any Body, pointed with many Angles and Edges on all sides, do as it were cut into the Sensory, like as if little bits of broken Glass be strictly pressed in ones hand. In these Kind of Subjects, the Saline Principle excells the other Elements.

Salt things naturally.

First, Bodies naturally Salt, are scarce met with in the family of Vegetables, altho Plants and Herbs, almost all, owe their rise and growth to Salt. It is seen however that

that Sea Scurvigrass, and Capers have something of a salt Savour. Salt obtains the chief place among Minerals, and salsitude or saltness is chiefly eminent in Sea-Salt, in Salt that is dug up, Nitre, and Sal Gemmæ. The Excrements of Animals, to wit, the Dung, the Swet, the Serum, are Salt; Blood also participates something of the Nature of Saltishness.

Secondly, Those Salts which are made by an artificial means, are the fixed Salts of Herbs, made by incineration or burning to Ashes: Compounded Salts, to wit, Borax, Sal Ammoniac. A volatile Salt is drawn forth of Amber, Bones, Horns, and also out of the Blood of Animals, by Sublimation. *2. Things which are so made by Art.*

Thirdly, As to the Third, all natural Salts, if they be distilled often over again, pass into acetous or tart Liquors: The reason of which is, because these kind of Concretes suffer a divorce of the other Principles, by the fire, and so come more near to the Simple and Elementary Nature of Salt. Volatile Salts, at first white, if exposed to the Moisture of the Air, do melt into a reddish Liquor, not very Salt, and besides smelling like the stink of smoak or soot; because the mixture being loosned by the moist Air, the Saline Particles, for that they are volatile, many of them fly away, but in the mean time, the Sulphureous Particles, before subjugated, get the Dominion. *3. By what means saltness is wont to be taken away or altered.*

Fourthly, The Acid, or sour, or tart Savour or Taste, seems to be made, when the Particles of any Body are four pointed or corner'd (to wit, which appear with a smooth and acute point, and with a sharp Body, like a wedge made into a bigger bulk) so that which way soever applyed to the Sensory, they prick it, and by pressing it, something bind it up; and therefore they leave in it larger Incisions than any other Savour. This Kind of Savour, for the most part depends upon a fixed Salt, carried forth into a Flux. *4. The Acid or tart savour.*

First, Bodies naturally acid or sower, are among Vegetables, Pomecitrons, Oringes, Lemons, Berberries, Sorrel, Tamarinds, *&c.* Among Minerals scarce any to be met with, as I remember, nor is it easily to be found among Animals, unless perhaps the Melancholly Juice, the ferments of the Stomach, and Spleen, the Pancratic Juice, and also the fasting spittle of a Man, may be said to be something Acid. *1. Natural Acids.*

Secondly, Made Acids, are Vinegar, and the Spirit of it, or the Liquor distilled: The Melancholic Humor preternaturally begotten in the Body, which often like the Spirit of Vitriol, becomes Acid, and almost Corrosive. Vitriol, Salt, and Sulphur, being whole, and tasted in their solid substance, shew no kind of acidity, if they be made subject to Chymical Operation, send forth a Liquor highly acid; the reason of which was shewed but now. *2. Made Acids.*

Thirdly, As to the Third, Chymists say, that acetous Spirits, to wit, of Sulphur, Salt, Vitriol, *&c.* by a long Digestion and Circulation, do grow sweet. All acetous Mineral Spirits, also distilled Vinegar, and the juice of Vegetables; if they dissolve any Body, by knawing or corroding it, as Corals, Pearls, or any Precious Stones, put away their acidness; because the Particles of the fluid Salt, in the acid Stagma or Menstruum, are fixed to the *Alchali* Salt in the mixture. Moreover, these Kinds of Spirits, and acetous Liquors, if they are mixed, either with Oil of Tartar, or with the fixed Salts of Herbs, loosed by Deliquium, loose their acidity. The Spirit of Vinegar being poured upon Salt of Tartar, and drawn off by distillation, becomes insipid. Spirit of Vitriol poured upon Quick-silver, and drawn off by distillation, putting away its acidity, acquires a taste like Allum; and if we may believe *Helmont*, passes by Coagulation into true Alum. Distilled Vinegar impregnated with the solution of *Minium*, or red Lead, grows wonderfully sweet. *3. By what means an Acid savour is wont to be taken away, or altered.*

5. The Sower, austere, or binding or astringent Savour, arises in Bodies, whose Particles are stuffed with very many little Spears and Hooks, which in chewing, being rolled upon the Sensory, are fixed to it, and greatly draw together, and pull its Fibres; not much unlike, as if a Comb, which Cards Wool, should be drawn up and down upon the hands. In substances indued with an austere savour, a fixed Salt, enwrapped with the Particles of the earthy Element, predominates. *5. Austere or sower Taste.*

First, Bodies naturally austere, among Vegetables, are the Fruit of the Medlar-Tree, of the Dog-Bryer, of the Cypress-Tree, Flowers of Pomegranat, Galls, Slows, Sumach, *&c.* Among Minerals Alum, Iron, Vitriol. Among living Creatures, or among their Parts, there is not as I remember, any austere savour to be met with. *1. Naturally austere things.*

Secondly, Bodies Artificially produced, which have an austere, sower or rough savour, are all made Vitriols, to wit, the Vitriol of Silver, of Steel, of Tin, of Copper, *&c.* The reason of which is, because in these Minerals, the Saline Particles, are very much intangled with Terrene, and they continue in the same state, when they are *2. Made austere savours.*

drawn forth from their Substances, by the soluted Mixtion. Spirit of Vitriol being drawn from Mercury, by frequent Cohobations, acquires a Pontick or Aluminous Savour.

3. By what means an austere or rough Taste, is wont to be taken away, or altered.

Thirdly, As to the Instances, by which an austere, sower, or rough taste, may be taken away out of all Substances, it is to be observed, that Vitriol of every Kind, by long distillation and circulation with the Spirit made of Wine, grows sweet, and loses its astringent force. If waters impregnated with Vitriol, be poured into Oil of Tartar, there will be precipitated a certain thickish Matter wonderfully sweet. Steel, Tin, or Lead, being dissolved in Vinegar, and Coagulated by Evaporation, go into sweet Salts. Further, it is a common Experiment: If having before tasted Vitriol, you take the fume of Tobacco at your Mouth, the austere taste at first impressed on the Sense, is changed into a plainly honied sweetness; the reason of which is, because the Sea-salt Particles, such as are in Vitriol, being mingled with the Sulphureous, out of the burnt Tobacco, create a sweet Savour: from whence also we may Collect, that Sugar and Honey, are of a Sulphureous-saline Nature; which also clearly appears, by their distillation, for as much as they, like Salt Minerals, yield an Acid and very Corrosive Stagma.

VI. A sower Taste.

6. Of Kin to the austere, is the acerb or sower taste, the Particles of whose subject, are indued with little Tenters or Hooks, or Claws, but which are more dull and blunt, and with which they strike the Sensory, and stop up its little Pores, and being once fixed, they are not easily removed; whence a stupor or numness in the Teeth and Palat is caused; not unlike Burdocks, which being fixed to the Skin, become troublesome, and are not easily shaken off. In acerb or sower biting Bodies, a fluid Salt, implicated with an earthy Matter, excells.

1. Bodies naturally acerb or sower.

First, Bodies naturally sower among Vegetables, are unripe Fruits; as Grapes, Pears, and Apples, and most of all Wildings, Crabs, or wild Apples, thô kept till they are mellow: also sower Herbs. Among Minerals, or Animals, there is nothing easily to be met with, that has a sower Taste.

2. Made sower things.

Secondly, Bodies that are made sower anew, are chiefly Wine and Beer, degenerating into a deadness, through Age or Thunder; also Leaven, or Bread too much leavened, Broths and Milk-meats, if they Contract a settlement and hoariness, become sower: because in all those Concretes disposed to Corruption, the Saline Particles being exalted, and tending towards a Flux, carry forth also earthy Particles involved with themselves.

3. By what means the sower Taste, is wont to be taken away, or altered.

Thirdly, As to the taking away of this Taste, we have observed, That sower Fruits do grow sweet, either by the goodness of the Air, and Sun; in sower Fruits brought to maturity: or by the goodness of the Ground or Soil, as when wild Apples translated to a good Soil grow sweet; the reason of either is, because the Spirituous and Sulphureous Particles before subjugated, at length Predominate over the Saline. If Wine degenerated into deadness, is impregnated with new Lees of *Tartar*, it shall recover its Vigor: The like happens, if a Can of good Wine be poured into a Vessel of sower Beer or Ale. Wine growing dead, if it be distilled, often yields a sweet Spirit, and in no less quantity, than if the Wine had been in its full strength; because the Spirits before subjugated in that Mixture, recover their Dominion by distillation.

VII. The sweet savour.

Seventhly, The sweet savour seems to be made, for as much as the Particles of any Body are so figured, into soft prickles, that they tickle the Sensory, with a soft rubbing, and from thence stir up a delightful Sense of Pleasure; like as if feathers were applyed to the Sides, or the Soles of the Feet. In these the Saline Principle seems to be associated, with Sulphureous and Spirituous, and when they are, in like manner are carried forth.

1. What are naturally sweet.

First, Those which are naturally sweet, are among Vegetables, first Sugar, and Manna; then Cassia, ripe Fruits, Grapes, Raisons, some Roots, as Parsnips, *&c.* Among Animals, some ascribe Honey, but others more rightly, say that is swet out of Plants, and gathered by Bees. Among Minerals nothing (that I know) hath naturally a sweet Savour.

2. Sweets prepared by Art.

Secondly, The things which have a sweet Taste, and are made by Art, are the Sugar of Lead, Salt of Steel, Lythargires, yea, and out of many other Bodies, Vinegar extracts a sweet Salt. Tasting Vitriol before-hand (as was said) and then taking a Pipe of Tobacco, the smoke grows sweet like Honey. In this, and in the former instances, whilst the Saline little darts grow to the Sulphureous Particles, or Saline of another Kind, both of them become more blunt. An *Alchalisat* Spirit, and the fixed Salt of any Body, being mixed, and circulated by a long digestion, acquire a sweetness. Barley soaked in Water, when it begins to sprout, and dried with a gentle fire, grows exceeding sweet: And Wheat in like manner also, if being wet, it sprouts yields a wonderfully

sweet

ſweet Meal; the reaſon of which is, becauſe by that Artifice, the Sulphureous and Spirituous Particles, overthrown by the Earthy, get their Liberty.

Thirdly, There are many Inſtances, by which ſweetneſs is aboliſhed; for all ſweet things too much boiled, grow bitter. Sugar or Honey, by diſtillation, yield at firſt an inſipid Phlegm, then ſharp and burning Spirits; In the dead Head remaining after diſtillation, is a burning Salt, and an inſipid Earth, and whatever is ſweet periſhes. Further, Sugar or Honey being mixed with a great quantity of Common Water, and diſtilled through a Bladder, yield a burning Water, like the Lees of Wine diſtilled after the ſame faſhion. In both theſe, and in the following Inſtance, the additional ſweetneſſes are bruiſed, by the ſaline little darts, Sugar of Lead being fuſed by the fire, melts into meer Lead; if it be diſtilled in a Retort, if we may believe *Beguinus*, it will produce a burning and ſweet ſmelling Spirit. *3. By what means ſweetneſs is taken away, or altered.*

8. The unctuous or oyly ſavour, ſeems to be produced, when the Particles of any Body are very Spherical and round, which neither hawl, prick, nor tickle the Senſory, but only ſtroke it with a gentle and ſoft coming to it. In theſe, the Sulphureous Principle predominates. *VIII. An Oyly Taſte.*

Firſt, Bodies naturally Unctuous or oyly, among Vegetables, are ripe Olives, the Turpentine-Tree. The Larix, and ſome ſweet ſmelling Gums naturally ſweating forth. Among Minerals, Aſphaltum, Bitumen, Amber, Sperma Ceti, and ſome fat Earths, and Ochers: Of Animals, and their Parts, the Sewet, Marrow, and Fat. *1. In which it is by Nature.*

Secondly, Unctuous things prepared by Art, are Butter, Cream, Oyls, preſs'd out of Fruits and Seeds, as Oyl of Nuts, of ſweet Almonds; alſo Oyls drawn out of Seeds, Woods, Gums, and Reſines by diſtillation. *2. In what things it is wont to be produced by Art.*

Thirdly, Altho unctuoſity is moſt difficultly taken away from the Subjects, yet it is wont to be leſſen'd: for ſo Unctuous Bodies, if they grow ſtale, or are too much boiled, or otherways grow hot by ſhaking, loſing their ſmoothneſs, become rank, and prick and dig the Senſory. Further, Sewet and Fat, if they be long expoſed to a moiſt Air, contract a ſettlement, and become hoary, and then are reſolved into Water, or a corrupt Earth. In this, and in the former inſtance, whil'ſt the mixture of the Body is reſolved, ſome Sulphureous Particles fly away, in the mean time the remaining loſe their Dominion. *3. How it is taken away or alter'd.*

9. An inſipid Savour or Taſte, ſeems to be made, when the Particles of any Body, are indued with ſuperficial little Darts, not at all ſharp, but ſmooth and diſcharged; which enter not into the Pores of the Senſory, and no ways dig or hawl it. In theſe, the Principle either of Water, or Earth, predominate over the reſt. *IX. An inſipid Savour.*

Firſt, Bodies naturally inſipid or taſtleſs, are Common Water, eſpecially Rain Water, ſome cold Herbs, the raw white of an Egg, *&c.* Altho in the whole world, there is nothing inſipid ſimply, yet Speech is wont to apply it to them things, in which ſome one of thoſe Savours, are not eminently, which we have before recounted. *1. In what things it is by Nature.*

Secondly, That Savory things may become Unſavory, the more acute Particles ought wholly to fly away, or be very much broken. Herbs long kept, alſo many more things, if they be diſtilled by a moderate heat, yield almoſt an inſipid Liquor. *2. How it is wont to be produced.*

Thirdly, Inſipidneſs it ſelf, ſometimes is taken away; for inſipid Water, if it ſtand long, that it putrifie, acquires a ſtink and mouldy Savour: The white of an Egg boiled hard, has ſomething a ſharp taſte. In theſe kind of Inſtances, ſome active Elements, being before ſubjugated, get ſtrength. *3. By what means it is taken away.*

Beſides theſe Kinds of ſimple Savours, which are as it were the Elements of the reſt, there remain yet many Complications of theſe ſimple ones, as the Savours rehearſed are conjoyned one among another: And for as much as by the Wiſdom of Nature, to ſatisfie all Palates, and by the Luxury of Art, that ſhe might pleaſe the Throats of ſome, manifold mixtures of Savours have been produced, that almoſt nothing to be eaten, is found ſimple and without Sawce or Condiment. The ſeveral Compoſitions of theſe, is a thing almoſt impoſſible to enumerate; it ſhall ſuffice for the preſent, that we note ſome of the more noted Conjugations, and their Affections, as they are grateful or ingrateful to the Palate. *Compounded Savours.*

The firſt Conjugation, and that moſt grateful to the Palate, is of acid and ſweet, of which ſort are generous Wine, Confections prepared out of Citron, Wood-Sorrel, Berberries, *&c.* Sugar'd things, and ſharp things pickl'd, with Sugar. Secondly, Sweet and Aſtringent, as alſo ſweet and ſower, are well Conſociated: as in Marmalade of Quinces, Candied Bulloes, Cyder drunk with Sugar, *&c.* Thirdly, Sweet and oyly yield a grateful Savour to the Palate, but that brings a nauſeouſneſs to the Stomach, as in Milk-meats, Sugar'd-meats, and Paſty-cruſt, *&c.* Fourthly, Sweet agrees not with biting, bitter, or ſalt Savour. Fifthly, nor doth a bitter Savour of it ſelf, agree with any other: it is grateful to the Palate, well-tempered with the ſweet. Sixthly, Salt- *Compoſitions of Savours, which are more or leſs grateful.*

ſavour beſt agrees with the biting ſharp, as in fleſh ſeaſoned with Salt and Pepper, it is an ingrateful Sawce with the oyly. Seventhly, The Acid, Aſtringent and Sower, are well aſſociated with the ſweet, not with the reſt.

There are more Kinds of ſome other Compounded Savours, which we have no time now to recount. But there are in reſpect of the Taſte, as the Compounded Tunes of Harmony in reſpect of Hearing, in both ſenſible not ſimple Species of one Kind, but are carried manifold, and variouſly Complicated to the Senſory. It now remains for us to paſs from the Taſte, the Object of which we have largely handled, to the other Species of the Senſes.

CHAP. XIII.

Of the Senſe of Smelling.

IT ſeems that the Smell is a more Excellent, and a little more Sublime Faculty, than either Taſting, or Touching; to wit, becauſe its Object is more ſubtle, and comes to the Senſory, with a thinner Conſiſtency: for there is no need to put upon the Organ, the more thick ſubſtance of the mixture; but it ſuffices, that the Effluvia's or Breath, ſent from odorous Bodies, thô at ſomething a remote diſtance, be inſpired into the Noſtrils, together with the Air.

The uſe of the Smell, to diſcern Aliments at a diſtance.

Living Creatures are furniſhed with the Senſe of Smelling for this end, to wit, that agreeable and wholeſom Aliments may be known, and diſcerned from diſagreeable and hurtful; for becauſe it were an incongruous and dangerous thing, to take in preſently into the Mouth, all things offered to be eaten, and to be examined by the Taſte, leſt perchance Venomous and Stinking things, careleſly taken in by the Palate, ſhould bring loathing or hurt to it, the Smell examines firſt the thing at a diſtance, and refuſes thoſe rotten things, or guilty of any other very infeſtous quality, without receiving any hurt by the Contagion.

This is more excellent in Brutes than in Man.

This Kind of Primary uſe is ſeen more excellently in brute Animals, than in Man; for they by this Index only, moſt certainly know the Virtues of Herbs, and of other Bodies, before unknown, yea hunt out, and eaſily find their abſent Food, thô hidden from them, by the Smell. But that the Noſes of Men are leſs quick or ſagacious, it ought not (as ſome would have it) to be aſcribed to the abuſe of the Faculty, but the Cauſe lyes in the defect of the Organ it ſelf; for this is not ſo accurately required for the diſtinction of Humane Food, where Reaſon and the Intellect are preſent: For that Reaſon the inferior Powers in Man, exiſt leſs perfect by Nature, that there might be a place left, for the exerciſe and dreſſing of the more ſuperior.

The Organ of the Smell deſcribed.

As to what belongs to the Organ of Smelling, we have largely enough unfolded it in our Diſcourſe of the Nerves; to wit, we have ſhewed, that within the Caverns of the Noſtrils, are placed tubulated Membranes or like Pipes, which contain ſenſible Fibres, moſt thickly interwoven. Into theſe Membranes, very many ſmall Nerves are ſent from either Mamillary Proceſs, paſſing thorow the holes of the Seive-like Bones; but thoſe Mamillary Proceſſes, as they are plainly ſoft Nerves, ariſe in the Medullary Trunk, nigh the ſtreaked Bodies; wherefore, when the odorous ſteams, ſtrike upon the Fibrous, and very ſenſible Membranes, forthwith an impreſſion of the ſenſible thing, is carried by the paſſage of the Nerves into the Mamillary Proceſſes, and from thence into the ſtreaked Bodies.

Further, We have formerly declared, why the Smelling Nerves, divided without the Skull are harder, but united within it are not only ſofter, but alſo tubulated or like Pipes, and for the moſt part in Brutes, filled with clear Water: There is no need to repeat it here again, nor what we have declared there, concerning other Nerves, coming from the Fifth pair, and inſerted alſo into the Organ of Smelling: Of which certainly the Office is, to cauſe a certain Sympathy and conſent of action, between the Smell and Taſte, and ſomething alſo between the Sight and it.

Nerves of a ſeveral Kind, ſerve for Smelling.

I know ſome attribute the office of Smelling altogether to theſe Nerves, ariſing from the Fifth pair, denying it to the Mamillary Proceſſes, and from hence they render a reaſon, not only of that conſent, between the Noſe and the Palate, from whence it comes to paſs, that the ſame Objects are embraced or refuſed, but alſo, wherefore it happens, that one Senſe being loſt, that oftentimes the other periſhes; to wit the Cauſe of this

they

they ſay is nothing elſe, than that both Senſories do borrow the branches of their Nerves, from the ſame Trunk of the Fifth pair. But this Objection is eaſily overthrown, becauſe the Nerves of a twofold Original, are beſtowed not only on the Senſory of the Smell, but alſo of the Taſte. For the Tongue receives more and greater Branches from the Ninth pair, than from the Maxillary Trunk of the Fifth pair: to wit, that if the Nerves of one Kind be obſtructed, the Animal Function may be performed, by thoſe of the other Kind. Concerning this then we may ſay, that the Principle Nerves ſerving to the Organ of Smelling, are derived from either Mamillary Proceſs, alſo, that the Nerves on which the Senſe of Taſting chiefly depends, are ſent from the Ninth pair: Nevertheleſs, ſome ſecondary Nerves, or that are as it were taken in, are diſtributed to either Senſory, (as alſo to the Eye) far fetch'd from the Fifth pair: for this end, that there might be an affinity or mutual reſpect, between the Taſte and the Smell, and between both and the Sight: hence therefore the Taſte almoſt admits of no Object, unleſs that the Smell firſt approves of it: but both Faculties do require, that ſenſible things do firſt ſtand to the examination of the Eyes.

Hence the reaſon is had, of that Conſent, between the Smell and the Taſte.

But that the loſs of one of them, oftentimes brings in the defect of the other, as it is ſometimes obſerved in a Poſe, or Stopping of the Head, that loſing the Smell, the Taſte is loſt alſo: the reaſon of it is, becauſe either Senſory, being planted near, are both at once overthrown by the ſame ſerous Matter, poured forth from the Blood, and apt to be too much ſtopped: for both the tubulated Membranes of the Noſe, and the frame or ſubſtance of the Tongue it ſelf, are made of a very rare, and as it were ſpongy Texture: wherefore, the Pores and Paſſages of either Organ, are wont to be overflown by the ſerous flood, and the ſenſible Fibres in both, in like manner to be obſtructed, which happens, becauſe when as the Noſtrils and Tongue ought to be moiſtned, with a continual Humor, either of them are puniſhed more grievouſly than other Parts, by the ſhower of the Serum iſſuing forth, ſo both on every light Cauſe, become obnoxious to the ſame Evil.

Why one being wanting, the other for the moſt part is Defective.

CHAP. XIV.

Of the Senſe of Hearing.

AFter the Smell and Taſte, of which we have already treated, we ſhall next ſpeak of Hearing; which as to the uſe, is far more Excellent than the other Senſes; for as much as by its help chiefly, Sciences and Learning are acquired, alſo by whoſe inſtinct, the Paſſions are excited; yea, and are wont to be governed and allayed; further as to Activity, this Senſe is much more Efficacious, becauſe having got a larger Sphear, perceives its Objects at a great diſtance, and admits not the ſenſible Species, unleſs brought in a more thin conſiſtency: For that it is the Intereſt of living Creatures, to know ſome remote things by Contact, and often placed out of Sight, becauſe they may be timely prevented, if they ſhould be inimical and diſagreeable, but if thought amicable, that they may be come to, and apprehended; the Hearing ſerves for either Intention, and by its ſign, the Marks and Symbols of approaching Bodies are received afar off.

The Excellency of Hearing, as to Uſe and Activity.

Becauſe the Hearing is always performed at a diſtance, and a ſound comes often farther than the Effluvia's of a ſounding Body, can be admitted; therefore, this Senſe is ſuppoſed to be made even as Sight, by reaſon of a certain activity of the Medium it ſelf, or by a Motion, and as it were a certain waving of little Bodies, which flow in it; ſo as the ſounding Body, moves by its Vibration or ſhaking the Particles diffuſed in the intermediate ſpace, and they being moved, at length affect the Senſory; but they conceive a certain Figure of their carrying forth, according to the Particles firſt agitated, and they propagate the ſame in others, and then in others, or move forward, as it were by undulation, and ſo the ſound, ſtill retaining the Character or Type of the firſt Impreſſion, is continued even to the Ear.

Is performed at a diſtance, by reaſon of the Activity of the Medium.

Althô by the conſent of all, the Air is ſaid to be the Medium, that carries the ſounds, yet this ought not to be underſtood of the whole Atmoſphear of the Air, and Breaths; for neither is the audible Species poured forth, by the Motion of this moſt fluid Body, as it were by a waving of Waters; becauſe this much ſooner runs thorow, than the Body or Conſiſtency of the whole Air is wont to be moved, and propagate its Fluctuation,

The Medium carrying ſounds is the Air, but not the whole frame of it.

as may be diſcerned plainly by the ſucceſſive blowing of the Winds, and bending of Trees, and the tops of Corn, which happens, becauſe any ſound, whether great or ſmall, whether it comes with or againſt the wind, is carried to a certain place, always with an equal time; which would be otherwiſe if it obey'd the waving of the whole Air, or ſhould depend upon that: Further, That the whole frame of the Air doth not wave, by reaſon of the tranſmiſſion of the ſound, appears by this; becauſe, if a Lamp be held in a little Bell, whil'ſt many other Bells being ſtruck together, yield a mighty ſound, its flame will hardly ſhake, much leſs will it be moved up and down hither and thither, by the moved Air.

The Sonorifick Particles ſeem to be Saline little Bodies, interwoven with the Air.

Hence it follows, that ſome Sonorifick Particles, or Cauſing ſounds, are diffuſed thorow the Air, and as they are more ſubtil than the little Bodies of the Air, and are indued with a more rapid Motion, the Tranſmiſſion or Propagation of the ſound, depends upon the peculiar motion and waving of theſe, made apart from the inclination of the whole Air. We have elſewhere ſhewn, in the texture of the Atoms of the Air, that there are contained Luminous or Nitrous Particles, by the inkindling, and by the moſt ſwift trajection, and reflection of theſe, Light, the appearances of Colours, and the Images of all things are produced. And beſides theſe moſt thin and moveable Bodies, which ſeem to be of a certain fiery Nature, and interwoven with the Air, and by the private waving of which, the viſible Objects are carried to the Organ, it is likely, that certain other Particles of another Kind, and thoſe perhaps Saline, are diffuſed thorow the rare and moſt fluid Conſtitution of the Air, by which, whil'ſt they are ſtrucken and ſwiftly moved, and apt to be figured, according to the Idea's of Sounds, the Organ of the Hearing is alſo affected, and by this means receives the Impreſſions of ſenſible things. For it ſeems, that the Sound-cauſing little Bodies ſwimming in the Air, and interwoven with a certain Continuity in its Pores, and thickly ſet in its paſſages, are placed after that manner, that when a Motion is impreſſed, in any Portion of them, by the ſtriking againſt a ſolid Body, they being agitated according to the Character of the Impreſſed Motion, move or ſhake others planted round about, and they again others, which are next to them, and ſo, when the ſame Motion is propagated round on every ſide, by a ſucceſſive affection of the ſame Particles, (as when a Stone being caſt into a ſmooth water, many little Circles beginning after one another, and unfolding themſelves, create an Impreſſion of the firſt ſtroke in every part) leſſer types of the ſound, and almoſt innumerable, take the place one of another, or fill up the room of the firſt Prototype ſound, excited according to the ſolid Body, and from thence on every ſide waved, according to the Symbolical Particles ſucceſſively moved; even after the ſame manner, as when the rayes of Light are reflected from an Opacous or ſhaddowy Body; for as much as they being ſent at hand from every part of the Object, do meet together in a moſt thick Series of Cones, in every place, and ſo create infinite Images of the ſame thing, viſible in all places: In like manner alſo, whil'ſt the Sonorific Particles leap back from a ſolid Body, they cauſe the audible Species to be every where repreſented, according to the ſtroke there made upon them, in the whole Sphear of Vibration, whether by a like Contortion, or Gyration, or any other ways of Conformation in Motion, of the ſymbolar Particles.

The Prototype of a ſound, by and by ſtirs up innumerable Ectypes.

How the Sonorifick Particles, differ from the luminous.

But althô there are found Sonorific little Bodies ſomething like the luminous, they are differenced notwithſtanding in many things; for firſt of all, their Motion is much more ſlow than the luminous, which clearly appears from a Gun being diſcharged at a diſtance, for it is ſometime after the flaſh reaches the Sight, that the report comes to the Ears. But the luminous Particles, thô they eaſily paſs thorow the more ſolid Diaphanous Bodies, yet not thorow thick ſhaddowy or Opacous Bodies, thô they are made of a more thin or rare texture; or ſtick in the chinks: On the contrary the waving of a ſound, does not ſo eaſily paſs thorow Glaſs, but the ſame is often heard within a Chamber, that is impervious of Light, or where Light cannot enter. Hence it may be conjectur'd, that the rayes or beams of Light, how ſubtil and thin ſoever they be, are carried only in ſtrait Lines; for whether they at firſt ſtream forth, or are broken in the altered Medium, or are reflected from an objected Body, they every where paſs forward, and obſerve the Line of direction, and paſs thorow the oblique and winding paſſages, not with a turning paſſage or going thorow; but the ſounding Particles, being excited into Motion, inſinuate themſelves within the bending pores and blind holes, like the flowing of Waters; but theſe Kind of little Bodies, which are the Vehicles of ſounds, I ſuſpect to be of a Saline Nature, for this reaſon; becauſe the Particles of this Element, are moſt of all Moveable and Active, next to the fiery and Nitrous Sulphureous; for it is ſeen, that Glaſs, and Metallick Bodies, which abound with very much Salt, being ſtruck, yield a ſound excelling all others: Alſo it makes for it, for as much as in a great Winter Froſt, when the Atmoſphear of the Air abounds with Saline Particles, a ſound becomes more clear, and is carried farther.

Theſe are carried only in ſtrait-lines, thoſe in all.

Why they ſeem to be Saline.

So

So much concerning the Sonorifick Particles, as much as we are able to get by Conjecture; concerning their Nature, Subsistence, and wayes of carrying forth, or of waving. As to these, what at first was propounded, concerning the Sense of Hearing it self, there remains yet to be unfolded, by what means, and for what occasions, these Particles interwoven with the aerial Body, are stirred up by a sounding Body into Act; then how the same being moved affect the Sensory.

By what means Sonorifick Particles are stirred up into Act.

As to the former, there are infinite ways, whereby the aforesaid Particles are stirred up into Act, or by which sounds are wont to be produced; whatsoever percussion of a solid Body, yea and almost every vehement Compulsion of the Air, when resisted, yields a sound. There are very many Varieties of these, but the Universal, or at least the chief Causes of sounds, may be not improperly reduced to two ways of being made; to wit, either that a solid Body being struck, and so affected with a Vibration or shaking, drives together the Air, and with it the Sonorific Particles, and the stroke being most swiftly repeated, causes them to shake or to wave; Or secondly, the Air, and with it the Sonorific Particles, being driven into a more narrow space, whil'st they go forth by Compression, are struck against the solid Body, and are driven by it into a vibration or shaking. By reason of the former way, all solid Bodies, struck by solids, yea and hollow Metallick Bodies, a Drum, the strings of an Harp, and other Musical Instruments, furnished with strings, when they are stroke, yield a sound; in all which, a vibration being excited from the stroke and shaking Body, and impressed on the Sonorific Particles, is the whole Cause of every produced sound, or of long Continuance, and also thó but of a minutes durance or sounding. For both Metals, also Stones, and Wood, and other solids, being struck, make the Air to tremble and yield vibrations or shakings, in some measure like Bells, and the strings of an Harp: Wherefore, when by the Finger or any soft Body being lay'd upon them, that shaking is stopt, presently the sound is intercepted. In the latter Rank, to wit, where the Air is compelled or straitned, whil'st it strives for liberty, striking against the solid Body, produces a sound, ought to be placed sounds, which are excited by speaking, wind Instruments, letting off of Guns, and the passage of winds thorow strait places.

Or how sound is caused, and stop'd.

The Motions, or spreadings of an excited sound.

As it thus appears, by what means the Sonorific Particles are stirred up into act, there remains a no less difficulty, concerning the way, whereby they affect the Organ of Hearing, that by it a Feeling or Sension is produced. We shewed before, that by reason of the aforesaid Particles being interwoven with the Air, and successively moved with a continued Series, the Impression of a sound is diffused every where, into a Round or Orb; Further, we Note, that if their waving promotion meet with any stop, the same being thereby reflected, or forced by another thing, it in like manner affects other Particles, wherever met with, and so is still broken into more sounds, which are carried hither and thither into every part; which is the reason that sounds climb over Houses, being sent forth at hand, return back, enter into every hole and chink, and easily propagate themselves into secret places and recesses, where light cannot enter: In the mean time, all sounds, both direct and reflected, and which are diverted aside, and which become less and numerous, from greater refracted and divided sounds, and variously result, exactly bear the Character of the Prototype of the same sound: Hence it comes to pass, that the Hearing being planted in every place, it receives the same sound in specie, and oftentimes articulate.

The Organ of the Hearing described.

But as to the second Proposition, for the manner of doing, whereby by the Sense of Hearing is performed, we think that first of all, the Structure of the Organ it self ought to be considered; in which, that which being utmost receives the first strokes of the sound is the Ear: This part being largely spread, by degrees grows narrow, till the hole made more narrow, leads inward to the den of the Ear. The use of the Ear is to gather together the Sonorific Particles, coming to it spread abroad and dispersed, and so many; that the Impression may be made more sensible, to direct it inwards towards the Sensory. In imitation of this natural Instrument, are wont to be made the Artificial whispering Instruments, which like a Pipe or Trumpet, by introducing many Sonorifick Particles, supplies the defect of Hearing. The Ears in most Beasts are moveable, that they might be turned every way, to any noise, and might receive a more certain notice of the sound, otherways uncertain; yea, it is probable, that mens Ears are moveable by Nature, because they have hanging Muscles, but that by the continual use of the Head-bands, which they make use of in Infants, this faculty is taken from them.

The Ear and its uses.

After the Ears, follows the Cave or Den of the Ear, leading obliquely towards the inward Parts. Whil'st the Sonorifick Particles pass thorow the turning and winding passages of this, the same, by reason of the frequent strikings and refractions against the sides, encrease the sensible Species; after the same manner, as is seen in Cornets, and wreathed Instruments, by which the sound is very much strengthen'd. Also this further

The Den of the Ear and its uses.

further appears, for that the Hollows or Cloyſters in ſome Walls, are wont to be ſo artificially made, that a low Voice whiſper'd, being tranſmitted by the ſame, may be heard at a great diſtance. Moreover, the aforeſaid Den of the Ear ought to be oblique and turning, that its more inward parts mought be defended from the eaſie meeting with of Injuries; and for this reaſon, there is there placed a bitter Wax, ſweat forth from the little Arteries; ſo that if any little living Creatures, ſhould by chance creep into the Ear, they might be there entangled, or at leaſt driven away by the Bitterneſs, as Worms by Gall. This yellow ſtuff without doubt is of the ſame Nature with that which is deſtinated for the Bladder of the Gall.

The Drum. Nigh to the moſt intimate receſs of this Den, a thin Membrane is placed, with a Circular Bone, fitted to the ſame, which wholly ſhuts up the Cavity of the Ear, and diſtinguiſhes the Interior Cloyſter from the Exterior; ſo that the Impulſe of the ſound, ſhaking this Membrane like a Drum, delivers the Impreſſion to the Sonorifick Particles planted beyond, and they being moved, affect the Fibres, with the Auditory or Hearing Nerve.

Three little Bones about the Drum, with the Muſcle and Ligament. About this Membrane, three little Bones, with a Muſcle and Ligament, and ſome other Parts, are placed; from which being thorowly view'd, and truly conſider'd, the Uſe and Offices of the Drum, and its whole Appendix, are clearly learnt. The firſt of theſe is a little ſmooth Bone, lying upon the more inward part of the Drum, and ſticking to it, this is commonly called the Hammer, either from its figure, or rather becauſe it is thought to ſtrike and knock againſt the Drum; when indeed, this Bone affixed to the Boſs or Shield of the Membrane, ſtrikes not againſt it, but bends inward, and draws it with it. Alſo, beſides this little Bone, is united with many other little Bodies, for the Tendon of the Muſcle, which lifts it up, and bends it inward, is inſerted into its ſharp Proceſs, and the other more blunt extremity of the Hammer, is ingrafted with the Anvil, ſo that the Hammer may be able to move round about upon the Anvil. This

The Hammer.

The Anvil. Anvil is a Bone almoſt round, which leaning into the Cavity, hath two proper Shanks, one whereof being fixed to the Cartilage, is faſtned by the ſame to the ſtony Bone; but the other ſhank of the Anvil is joyned by the Cartilage to a third Bone, called the Stir-

The Stirrop. rop; ſo that the Anvil being joyned by the Cartilage to the Stirrop, is alſo moveable; and the two ſhanks of the Stirrop are affixed to the Ligament, and by it ſtick to the ſtony

The Muſcle. Bone. As to the Muſcle, which lifts up the Hammer, (althô at firſt ſight only its Tendon appears) if it be farther ſearched, it is ſeen to be big enough and round, planted in its proper Cavity, the Tendon of which is inſerted into the ſharp proceſs of the Hammer, and lifting it up, and drawing it inwards, bends and diſtends the Drum within;

The Ligament. notwithſtanding, leſt this Muſcle (if it ſhould happen to be pulled) ſhould be brought too near to the Drum, a ſmooth a tranſverſe Ligament, is placed before the acute proceſs of the Hammer, which ſtrictly leans on the Hammer, and binds it; and leſt it ſhould be drawn beyond meaſure, by the Muſcle, contains it in its due ſite.

The uſe of the Drum. From theſe it is eaſily to be underſtood, what uſe theſe Parts are for, which we deſcribed: For it is ſeen, that the Drum is the Preliminary, and as it were Preparatory Inſtrument of Hearing, which receiving the firſt Impreſſion of the ſound, or ſenſible Species, directs them in due proportion, and apt conformity towards the Senſory, which is placed more inward: It performs the like office in reſpect of the Hearing, as the Coats of the Eye, conſtituting the Pupel or Apple, in reſpect of the Sight; either Membrane break and as it were ſoften the ſenſible Species, and deliver them to the Senſory in proportion, to which if they ſhould come naked, they might hurt or deſtroy eaſily its more thin Con-

The Drum hears not. ſtitution. Indeed the Drum does not hear, but contributes to the better and ſafer hearing. If this Part ſhould be deſtroyed, the Senſe may be ſtill continued for a while, thô after a rude manner: becauſe it appeared by an Experiment made in a Dog, that having boared both the Drums of his Ears, Hearing remained ſtill for a time, which after three Months wholly ceaſed, to wit, after the Conſtitution or Craſis of the Senſory, ſuffering by outward Injuries, was overturned.

The uſe of the little Bones, as alſo of the Muſcle, and Ligament. But that the Drum might truly perform this ſort of office of a Porter about the Hearing, its ſtretching forth ought to be bound or looſned, as occaſion ſerves, to wit, as the Pupil of the Eye is wont, as the matter requires, to be either contracted or dilated. Wherefore, certain Machines or Braces, like to a Drum of War, are appointed for the Drum of the Ear, which render its Superficies ſometimes more ſtiff, and ſometimes more looſe: For this, the three aforeſaid little Bones, with the Muſcle and Ligament, effect. The Muſcle lifting up the Hammer, whil'ſt it Contracts it ſelf, the Drum is diſtended, when it remits its endeavour, that is ſuffer'd to be looſned; but the Ligament moderates the action of the Muſcle, and hinders, leſt the Hammer being too much drawn up, ſhould diſtend the Drum till it break: But that the Rod or Beam (which is a part of the hammer) affixed to the Membrane, and drawing it to the Motion of the Muſcle, is not

one

one Bone, but three little Bones joynted in one another; the reaſon is, both that the drawing of the Membrane be not too hard and ſtiff, but with a certain ceaſing and flexibility of the Beam, without which the Drum, for that it is a moſt thin little skin, would be in danger to be broken; alſo, that by ſo many joyntings of the Beam, the motion of drawing might be determined, as occaſion ſerves, into various parts, hither and thither: This part hath almoſt the ſame uſe as the *Hyodes* Bone, which is made of many little Bones joynted together.

The involuntary Action of this Muſcle.

As to the Action of the Muſcle lifting up the Hammer, it ſeems that it is chiefly involuntary, and that 'tis acted by the inſtinct of Nature, according to the indigencies of the Bone; for when a ſound too vehement ſtrikes the Ears, this Muſcle remits its indeavour, that the ſenſible thing might ſtrike more ſtrongly the ſooſned Drum; but if a ſmaller or duller ſound enters, the Muſcle being contracted, diſtends the Drum, that the Impreſſion otherwayes obſcure may become more ſenſible: If that many voices and confuſed ſounds approach the Ears, it is probable, that the Drum diſpoſes the Species brought to it, after a diverſe manner of Action, and as it were admits them in, with a certain Choice.

Deafneſs ſometimes proceeds from the looſneſs of the Drum.

Altho Hearing is not made by the Drum, as the proper Organ of Senſe, yet this ſo much depends upon that, that oftentimes the Action of the Drum being hurt or hinder'd, a privation or a diminution of that Senſe follows. For we meet with a certain kind of Deafneſs, in which thoſe affected, ſeem wholly to want the Senſe of Hearing, yet as ſoon as a great noiſe, as of great Guns, Bells, or Drums, is made near to the Ears, they diſtinctly underſtand the ſpeeches of the by-ſtanders, but this great noiſe ceaſing, they preſently grow deaf again. I heard from a Credible Perſon, that he once knew a Woman, thô ſhe were Deaf, yet ſo long as a Drum was beaten within her Chamber, ſhe heard every word perfectly; wherefore her Husband kept a Drummer on purpoſe for his Servant, that by that means he might have ſome converſe with his Wife. Alſo I was told of another Deaf Perſon, who living near a Ring of Bells, as often as they all rung out, he could eaſily hear any word, and not elſe. Without doubt the reaſon of theſe is, that the Drum of it ſelf being continually looſe, by the impulſe of a more vehement ſound, is compelled to its due tenſity or ſtretching forth, by which it might in ſome meaſure be able to perform its office. But we will proceed in Order, to the other Parts of the auditory Organ.

The Cavern containing the Air, placed behind the Drum.

Behind the Drum, the Den or Cavity ſubſiſts, in which the Ancients placed the inplanted Air, which received the impreſſed ſound from the Drum: which thing indeed is not unlikely; for, becauſe the waving of the ſound ought to be conveyed ſtill further towards the Senſory, it ſeems that the Sonorifick Particles, which are their Vehicle, are contained within this Den; and becauſe it is needful, that the Sonorific Particles, included in this Den, ſhould be in ſome meaſure conſumed; therefore from this hidden place, there lyes an open paſſage into the Palate; but yet after that manner, that little doors being placed in its upper part, it admits the Air fetch'd from the Palate, as often as there is need; but the ſame being admitted into the Den of the Ear, its paſſage out by the ſame way is hindred. By reaſon of this Channel, it is, that the ſound becomes rather ſenſible to the Palate of ſome deaf People, than to their Ears; to wit, when the office of the Drum is ſpoiled, the ſenſible Impreſſion is carried, in ſome meaſure, to the Senſory, by this other way.

From this Den a Paſſage into the Palate.

Another Paſſage from this Den (called the Navel hole, or the Window) leading into the Shell.

But from the aforeſaid Den, placed behind the Drum, another paſſage leads towards that part, which is properly the Organ of Hearing; to wit, in the extream ſide of that Cavern, before-mentioned, there is a door, or certain round hole, covered with a thin Membrane, commonly called the Window, and beyond that hole, to wit, in the end or ſharp proceſs of the ſtony Bone, is the Shell contained: from whence we may think very well, that the impreſſion of the ſound brought through its next Chamber from the Drum, is from thence propagated, by an impulſe made above the Window, into the Shell.

The Deſcription of the Shell.

But the Body of the Shell is an admirable Structure, which being framed in a peculiar receſs of the ſtony Bone, is called by ſome the Labyrinth, by others the Shell; becauſe its paſſage or hollowneſs, after the manner of a Snails ſhell, is carried about with a turning or ſpiral Convolution. There are two parts of this, or rather there are two Shells, the former being nigh the chief Oval hole, is leſs'ned by degrees, from the Spire or more broad Capacity, and ends in a very little one, then from the end of this, another Shell, beginning with a very ſmall ſpire, is inlarged by degrees, in its progreſs, and its extremity opens with a greater aperture, into another Den or Chamber, placed beyond, with an open mouth; this is without any Membrane covering it.

The Uſe of it.

As to the Shell, the uſe of it ſeems to be, that the audible Species being brought thorow ſuch turning and winding Labyrinths, and ſo receiving an augmentation by reflection, and manifold refraction, it may become more clear and ſenſible; then further, that every

Impreſſion, carried about by this winding and very narrow way, may come more diſtinct to the Senſory: becauſe by this means, care is taken, that many confuſed Species together, may not be brought in. After the example and ſimilitude of this Shell, artificial Caverns, and arch'd Meanders, are wont to be framed by Architects, for the increaſing of ſounds, and for the diſtinct propagating of them to a wonderful diſtance. Further, there is another uſe of the Shell, no leſs noted, to wit, that the audible Species may be impreſſed on the Fibres and the ends of the ſenſible Nerves, inſerted in this place, not at once or at large, but by little and little, and as it were in a juſt proportion and dimenſion.

The auditory Nerves.

We have elſewhere diſcourſed concerning the Hearing Nerves, which receive the ſenſible Species, and carry it towards the Common Senſory, and we ſhewed, that the ſofter proceſs of either of the ſeventh pair, is deſtinated to this office; wherefore the end of this Nerve is terminated in the neareſt Chamber of the Shell, whence it is manifeſt, that the ſenſible Impreſſion, being diſpoſed from the Shell into this Chamber, is conveyed thence towards the Head, by the paſſage of this Nerve. But moreover (which we took not notice of before) it is obſerv'd, that this ſofter auditory proceſs, is cleft into two branches: one whereof is inſerted after the manner we have here deſcribed, into the aforeſaid Chamber; but the other, no leſs noted branch, is implanted in the Shell it ſelf, about the mid'ſt of it, or nigh to the meeting of either Labyrinth; ſo that this branch ſeems to receive the Depoſitum of the foremoſt Shell, and the other aforeſaid of the latter Shell.

Two Proceſſes of the ſofter auditory Nerve, one tends into the next Chamber of the Shell.

The other into the Shell it ſelf.

The extremity of either auditory Nerve, which are implanted about the end of either Shell, ending in ſlender thrids, ſeems to cover over the places of Inſertions, every where with Nervous Fibres ſpread abroad, as it were into a certain little Membrane; whence it follows, that towards the end of either ſhell, the proper Senſory of Hearing ought to be placed; for there is the Senſe, where the Nerve receiving the Idea of Senſion, is implanted; but as the Shell is twofold, and that in like manner there is a double inſertion of the forked auditory Nerve, it follows, that in either Ear, there is a twofold Organ of Hearing: but for what uſe this is ſo made, does not plainly appear.

For what Uſes it is ſo made.

That we may give our Conjecture concerning theſe, perhaps there is need for the audible Species, to be carried toward the common Senſory, that its paſſage may be the more certain, and that the perception of the ſenſible thing, may be put out of doubt; but we rather think, that this Senſory is made double, that when oftentimes the Idea's of ſounds ought to be heard and perceived together, ſome might paſs this way, and others that way, without Confuſion. For it is obſerv'd, that the Hearing, not only as the other Senſes, receives many objects together; and by and by whether united or confuſed, comprehends them, by the ſame act of the Senſe; but moreover, this faculty in the time of Hearing, ſo diſtinguiſhes things, often divers, admitted together at the Ears, that it ſeems to hear one after another: It ordinarily happen'd, that in a confuſed multitude of voices and ſounds, that I have my ſelf taken notice to have heard the peculiar voice of a certain Man, and then a little after, I have known that I have heard, at the ſame time, ſome other words of another Man, that I did not perceive before; the reaſon of which is, that this ſound, being received together with that, reached not at the ſame inſtant to the Common Senſory: wherefore, we may believe, that the ſenſible Species of the former ſound, paſſing thorow only one Shell, is by and by conveyed, by the firſt branch of the auditory Nerve, ſooner to the Senſory, but the other ſenſible Species, becauſe it could not be carried with it together by the ſame Nerve; therefore it is carried by a winding about thorow the ſecond Shell, and at length to the ſecond branch of the auditory Nerve, and ſo coming later to the Common Senſory, is afterwards perceived.

A rehearſal of the Parts, which ſerve for Hearing.

Thus much concerning the Inſtrument of Hearing, and its parts, both Preparitory, and chiefly Organical; of the firſt ſort are the Ear, the outward Den, the Drum, and what belongs to it, the interior Den, and its two doors; to wit, one admitting inward thorow the door from the palate, the other emitting thorow the oval hole: Of the latter ſort are, The twofold Shell, with both the Branches of the auditory or hearing Nerves. Both the Parts, for the moſt part, are of like make in all Animals; the greateſt mark of difference is, as to their Ears, which are variouſly figured, partly for ornament ſake, and partly for a diverſe uſe in reſpect of the inward Den, placed behind the Drum: for this is framed in a Calf, Sheep, and perhaps ſome other Animals, of ſpongy Bones, and long Caverns, having receſſes in themſelves; In Man, and in Doggs, and perhaps in many others, who are indued with a more acute Hearing, this Cavity is ſhut up with a round Bone, having a plain Superficies within, whence the ſound is reflected more ſtrongly into the Shell; but in a Calf, and Sheep, the ſound ſeems to be much broken and debilitated, in theſe bony Caverns; wherefore, theſe Animals are ſaid to have ſlow Ears; for it is not expedient, for ſuch deſtinated for to be fatted for Food, to hear acutely, that they might be affrighted and provoked by every Noiſe.

How they differ in Man, and in ſome four-footed Beaſts.

CHAP.

CHAP. XV.

Of the Sight.

IF there be any ſtrife for Dignity among the Senſes, the Palm is given, almoſt by the conſent of all, to Seeing, as the moſt noble Power; becauſe this faculty apprehends things at a great diſtance, under a moſt ſubtil Figure, by a moſt clear perception, and with great delight; ſo this Senſe acts, that is next in virtue to the Eternal and Immaterial Soul: To wit, it views and meaſures both Heaven and Earth in a Moment, and brings within its embraces whatever Bodies are ſituated in either, and that are far remote from our touch.

The Sight is the moſt noble Senſe.

'Tis needful that Seeing ſhould be ſo performed at a diſtance, that viſible things might diffuſe, and every where propagate themſelves by their Images far and wide; ſo that where-ever the Eye is ſtop'd, the Images of ſome Bodies objected are met with. But after what manner this is done, and by what means the ſenſible Species is received by the Organ, ought a little more deeply to be inquired into.

It acts at a diſtance by reaſon of the Species of viſible things diffuſed afar off.

As to the firſt, althô Light, Colours, and Images, are wont to be moved from place to place, and by the help of Glaſſes to be transferred hither and thither, and indeed affect the Eye with their Motion, yet it is manifeſt, that they are not meer Qualities, but certain Bodies, or conſiſt of moſt thin little Bodies. Theſe three are very much of Kin among themſelves, and differ little or nothing one from another, as to their Eſſence; for indeed, the ſame Effluvia's or little Bodies, for as much as they proceed from a lucid Body, are called Light, for that they are reflected from an opacous or ſhaddowy Body, under a certain placing and meeting together, cauſe the Image of the Object; and for as much as it happens, the ſame rays of Light, in their reflection, are broken or turned in, from a dark or opacous Body, after this or that manner, they cauſe the Appearance of this or that Colour to be repreſented.

Light, Colours, and Images, are the ſame ſubſtance.

As to the Rays themſelves, or the paſſing thorow of little Bodies, the irradiation or beaming forth of which, ſhews the Repreſentations either of Light, Colour, or Images, it is much diſputed; whether they are only Effluvia's, darted from a lucid Body, and repercuſſed in their going forth, and reflected variouſly here and there, as is aſſerted by *Gaſſendus*, and ſome others; or whether Particles being ſent forth from a lucid Body, move other the like Particles, implanted in the Air, and as it were by inkindling them render them luminous, and theſe at length others, and ſo a diffuſion on every ſide of Light, or Images, is propagated as it were by a certain waving.

What the Rays are, which cauſe the viſible Species.

Whether they are Particles, ſtreaming from a lucid Body,

Againſt the former Opinion 'tis objected, that it ſeems impoſſible, that the Effluvia's of flame or fire, ſhould be able to be unfolded ſo ſuddenly, and dilated or ſpread abroad to an immenſity: for when a Candle being lighted, immediately the whole Chamber is illuminated, it can ſcarce be conceived, that the fiery little Bodies of that flame, ſhould break forth ſo ſuddenly and ſo thick, that they ſhould fill, in the twink of an Eye, ſo vaſt a ſpace. For indeed, the new Motions and Increaſe of an inkindled flame, are more ſlow and perceivable to the Sight it ſelf; how therefore can we imagine, the motion or dilatation of Light, for that this is but only a thinner flame, to be ſo incredibly ſwift? Beſides, when in the ſame inſtant, in which a Light placed in an eminent place is inkindled, it is beheld at many Miles diſtance, none can think, that theſe Particles ſent forth from it, can be able to be carried ſo long a ſpace, at leaſt in ſo ſhort a time; but truly, how ſhould it be ſuppoſed, that theſe Effluvia's ſtreaming from a ſmall Light, ſhould preſently poſſeſs the whole Hemiſphear? Becauſe the light enkindled in the whole Region round about, meets with the Eye where-ever placed. Beſides, when from a Glow-worm, a certain kind of Light or fire ſhines in the dark, and is perceived at a diſtance, if this apparition ſhould be made by reaſon of the fiery little Bodies ſtreaming from this little Creature, whence I pray is ſo much fiery Tinder ſupplied? From theſe and ſome other Reaſons, we are led to believe, that when the Medium is ſo ſoon inlightned, beſides the Effluvia darted from the lucid Body, others alſo interwoven with, and implanted in the Air, being moved by thoſe Effluvia's, and as it were inkindled, contribute to illumination.

Or rather, whether inkindled Particles of Nitro-ſulphureous Air.

For the Explanation of this, hither ought to be referred what hath formerly been ſaid concerning the Nature of fire and flame; to wit, we have ſhewed, that with the Sulphureous Particles, breaking forth from an inflameable Body, others Nitrous do come from the Air, and are inkindled with them, and ſo do not conſtitute fire or flame, unleſs both

Which Opinion ſeems moſt likely.

The differences of flame, and light.

are joyntly inkindled. The like reaſon may be given of Light, and conſequently of Images, and Colours, moſt ſwiftly produced from Flame and Light: to wit, ſome Sulphureous Particles being carried beyond the compaſs of the Flame, joyn together with others Nitrous, and eaſily inkindled, and ſo produce a moſt thin Flame, *viz.* Light. For indeed, from an inkindled fire, many ſulphureous Particles preſently ſtreaming forth thickly, lay hold on more, or at leaſt the like Nitrous, and ſo conſtitute a more thick and almoſt dark Flame; this, for that it is fat and thick, paſſes not thorow the Pores of Glaſs, and thô it is apt of its own Nature, to be carried in direct lines, yet it is wont to be bent hither and thither, and to be made crooked by the blaſts of Wind, yea to be carried within Tubes or hollow Pipes very crooked. But Light is made of fewer and more ſubtil ſulphureous Particles, which paſſing beyond the firſt inkindling, fly away round about far and wide, and ſo meeting every where with many Nitrous, conſtitute a moſt thin white Flame, and without heat; this eaſily paſſes thorow Glaſs, and all clear Bodies: Its beams, for as much as they conſiſt of more Nitrous than Sulphureous little Bodies, are carried only in ſtrait lines, ſo that thô they are wont ordinarily to be broken or reflected, yet they cannot be made crooked.

Lucid Bodies, are either Cœleſtial,

Or Sublunary; in the light of which, we obſerve three meaſures.

Subjects emitting fiery and luciferous Particles, among the Cœleſtials are the Sun, and Stars; but among the Sublunaries, whatſoever are filled with Sulphur, are apt to flame forth. Concerning the Sun we note, that wherever it may be ſeen in the Earth, it diffuſes a clear Light, ſo do not the fixed Stars, becauſe they are at too great a diſtance from the Globe of the Earth. As to the Subluminary Lights, we ſhall obſerve, as it were three Stadia or meaſures, in which they have their Beams after a diverſe way; to wit, in the firſt place, the Flame conſiſts within the compaſs of a lucid Body, which is both hot, and diſperſes heat every where round about, to what is near, not only by the open Air, but alſo by all Bodies, to wit, both diaphanous and dark, ſolid or rare. Secondly, In the extream Border of the Flame ſucceeds the Sphear of Light, which being more illuſtrious near the Flame, is by degrees attenuated, till it ends in plain darkneſs. Beyond the bound of the Light, the lucid Body propagates its Image or likeneſs a great way; for a Candle being inkindled, is beheld for many Miles in the dark: The trajection of which ſeems to be made, by reaſon of the Impreſſion made on the Nitrous Particles, diffuſed thorow the Air; wherefore when the accenſion ends, about the border of Light, yet from thence it at a long diſtance tranſmits every way an Idea of the Flame or Light, by a moſt ſwift undulation or waving of them being moved.

Wherefore light, either reflected, or refracted, goes forward only in ſtrait lines.

The trajection or the paſſing thorow of the Rays of Light, whether the ſame be direct, or reflected, or broken, goes forward (as we hinted but now) only in ſtrait lines, and not in oblique, or turning about: the reaſon of which is, becauſe the fiery or light-carrying Particles, how ſubtil or active ſoever they be, moſt eaſily paſs thorow, and without any impediment, the Pores and Paſſages of the Air, and follow not its Courſe or Torrent. Further, as the fiery Particles (as it ſeems) are only of a Spherical Figure, and of a very ſmall bulk, their irradiation or beaming forth, is made only in direct or ſtrait lines: to wit, becauſe, when the little Globes breaking forth from any fire, ſtream thickly forth on every ſide, and that the former are joyned to the latter, it is neceſſary, that they ſhould be driven forward to the ſide, ſtill without any declination: for as much as if Pricks be driven one from another, their progreſs create a ſtrait line.

Light can paſs thorow a Chamber, in the mean time, not to be perceived.

But hence it happens, that Light does not as a Sound or Odors, paſs thorow winding chinks, or paſſages of holes; yea, neither do we perceive the Sun or Stars, nor the Beams of a Sublunary Light, unleſs the ſame meet the Eye direct, or reflected, or refracted; for it may be made, that an handful of the Beams of Light, may paſs thorow a Chamber whole, that in the mean time the Eye, placed in it, may perceive nothing of brightneſs. For Example, Let there be bored in one end of the Chamber a ſmall hole, and in the other oppoſite a greater, in the ſpace then without the leſs hole; if a Light or Lamp be placed, it ſhall illuminate that ſpace placed without the greater hole, in the mean time, the Chamber between which the Beams of the ſame Light paſſes thorow, ſhall be ſeen dark: The reaſon of which is, becauſe the Beams, paſſing thorow, for that they neither unfold themſelves abroad, nor are reflected, meet not the Eye placed without the line, and therefore create no appearance of Light: alſo, for that reaſon it is, that when we look up from the bottom of a Pit, at Noon day, it is as if it were quite night, and we behold clearly the Stars themſelves, without any appearance of Light.

Light Primary, or Secondary.

But althô Light is devolved into every Part round about, not by a waving fluctuation, but proceeds with only ſtrait rays or ſtrokes, yet theſe rays ſtream forth ſo thickly, and being reflected from Bodies after a manifold way, meet one another, mutually joyn, and are ſent together, with ſo thick a Series, that not rarely almoſt the whole Pores or Paſſages of the Air, are poſſeſſed by them, either direct, or refracted, or reflected. Wherefore

fore Light is wont to be diſtinguiſhed, either that which is Primary, which proceeds immediately from Light; Or Secondary, which is reflected from Objects, which ſort of reflection of it, is wont to be many time reiterated.

Concerning the Primary Light we obſerve, that its Beams, from whatever Light they proceed, either Cœleſtial or Sublunary, are almoſt the ſame; hence it is, when many of a diverſe Original are mixed together, they are not eaſily known aſunder, becauſe the leſſer Light is always obſcured by the greater: But the Secondary Light, or Beams reflected from ſolid Bodies, that beſides, by redoubling the illumination, they render the Medium more clear; alſo, according as they are variouſly modified from Objects, in their being reflected, they create the appearances of Images and Colours.

The differences of theſe.

Concerning the Nature of Colours and Images, as the Philoſophers of every Age, have diſputed it, and that divers Opinions are delivered, by ſeveral Authors, none as I think has diſcours'd more ingeniouſly, or more like to Truth about this, than the famous *Gaſſendus*; wherefore, if it may be lawful to Plow with his Heifer, we will add the whole Matter in a ſhort ſummary.

The reaſons of Colours and Images unfolded.

Every viſible thing or Body is lucid, or illuſtrated from Light; That, is beheld by its proper Light, and by direct Rays; This by another, and by reflected Beams; but the Medium is not ſeen purely perſpicuous, becauſe it emits not proper Beams, nor reflects others, by reaſon of its thinneſs. Concerning a lucid Body we obſerve, that this ſhining clearly and without any Impediment, appears under a bright form; wherefore Light in a fountain, is of a white ſhining Colour, but that it alters its Colour, it is nothing elſe than the intermixture made in its Beams, of ſhaddows or darkneſſes; but this is made either by reaſon of little Bodies, being between in the Medium, which avert ſome Beams: So the Sun ſeems red in the Horizon, by reaſon of Vapours which intercept many Beams, or the whiteneſs of a lucid Body degenerates, by reaſon of Particles, not lucid, interſperſed within its Body, and with the Beams themſelves; ſo when Soot and Smoke ſtream forth with the inkindled Light, the Light becomes more red or darkiſh.

According to Gaſſendus, *Every Body is either lucid, or illuſtrated.*

The Colour of a Light Body is white.

Which is variouſly altered, by reaſon of interſperſed Clouds.

As a lucid, ſo alſo an illuſtrated Body, appears not pure, but altered, under the form of whiteneſs; for becauſe the Rays are not all reflected, but by reaſon of the inequallities of the Superficies, ſome are wholly immerged, and others averted, therefore not a pure whiteneſs, but another Colour is ſeen in it. Indeed, as an illuſtrated Body is more ſmooth and polite, that it may reflect many Beams, the more bright and ſhining it appears, as is manifeſt by a Looking-Glaſs; but the more rough and rugged the Superficies is, that it hides many Beams, or averts them, the more the form of whiteneſs degenerates.

An illuſtrated Body, as it is either ſmooth or rough, reflects Beams variouſly, and therefore produces various Colours.

Concerning the unequal Superficies of illuſtrated Bodies, two as it were extream diſpoſitions are to be obſerved, by which the proper whiteneſs of reflected Light is very much altered; for either the Superficies of a Body is render'd unequal, by many Swellings up, as it were little hills or bubbles thick ſet, by which, thô many Rays are turned aſide, yet by the divers faces of the little hills or riſings, Beams are reflected in a more thick heap, than from a ſmoothed plane, therefore there is made a white Colour, coming near to the whiteneſs it ſelf of Light. Or Secondly, The Superficies of an illuſtrated Body, gapes with very many Ditches or Pits, as it were Dens, in which the Rays entring, are wholly drowned, and are not reflected at all, from whence comes the black Colour, or a privation of white: after this manner, the two extream kinds of Colours, to wit, white and black, ſeem to be produced.

But as to the other intermediate Colours, beſides the Light, being reflected with little ſhaddows, and variouſly intermixt with darkneſs, we ought to ſuppoſe, the divers manner of refraction of its Beams, to be partly alſo the Cauſe; of which there is a certain ſign, for that in a Triangular Glaſs called the *Priſm*, the Beams being refracted diverſly, falling upon this or that Angle, are wont to ſhew Green, or Purple, or Yellow, or a Colour of ſome other Kind: In like manner we may believe, that alſo the Rays of Light being variouſly broken and turned inwards, in their reflection from an illuſtrated Body, and ſo cut and mixt together among themſelves, do produce all manner of differences of Colours. This is not a place here to treat of the particular Splendor of every Colour, and the manner of their Production, but it may ſuffice, that we have mentioned in general the reaſon of their appearances.

The variety of Colours alſo depends, upon the refraction of Beams.

But theſe things concerning the Nature of a viſible Object. and the manner of its trajection, being thus premiſed, it behoves us next to ſhew, after what way Sight or Seeing is performed, by reaſon of the ſenſible Species being ſo ſent from the Object, and received by the Organ. This commonly, and not improperly, is wont to be declared by the example of a Burning-Glaſs, which like a little Window is fixed before an hole made in the Wall of a ſhut up and dark Chamber; Becauſe, from the Bodies every where

A Burning-glaſs placed before a dark Chamber, declares how Sight is made.

where brought before that hole, the Rays of Light being reflected, meet together in the Glaſs, and in that paſſage cutting one another, ſpread themſelves at laſt within the Chamber, and ſo upon a white Wall within, repreſent a Landſchap of the whole viſible Hemiſphear. The Conformation of the Eye it ſelf is much after the ſame manner, for in it may be diſcovered, both the ſhut up Chamber, and humors as it were Dioptric Glaſſes, which gather together the Beams, and break them after a manifold way, all artificially diſpoſed; and laſtly, as it were a whited wall, *viz.* the *Retine* Coat, or the Membrane of the Eye, on which the Images of viſible things are Impreſſed.

The Organs of the Sight, are the Eyes, and the Optick Nerves.

Indeed the Eyes, and Optick Nerves belonging to them, perform the whole Act of Seeing; within the Cloyſters of theſe, the Images of all viſible things are formally painted, and by the paſſage of theſe, to wit, the Nerves, the perception of the Images there drawn is conveyed to the common Senſory: It now remains, that we conſider both the Fabrick in either Organ, and the particular uſes of the ſeveral Parts.

How the frame of the Eye, is fitted for Seeing.

As to the Frame and offices of the Eye, for the performing of which its Fabrick ſeems to be made, we ſhall take notice chiefly of three things to be done by it. To wit, In the firſt place, That the viſible Species, or Rays of Light, ſent from a lucid or from an illuſtrated Body, are intromitted by the Pupill, as it were thorow an hole. Secondly, The Rays ſo admitted being refracted, and artificially collected, through a fit Medium, are diſpoſed according to the beſt Dioptrick Rules. Thirdly, That the Images of things, reſulting from the due refraction and Coalition of the Beams, may be aptly repreſented, the interior Den of the Eye is formed, like a black Chamber with a white Wall, ſuſceptible of the Images.

The Anatomy of the Eye, neceſſary for the Explication of Seeing.

If it ſhould be further demanded, what kind of Fabrick it is of the Eye it ſelf, and after what manner its parts are diſpoſed, by which all its offices are performed, it will not be from the Matter, to ſhew here a perfect deſcription of the Eye and its Appendix, together with the offices and uſes of its parts, truly lay'd down. For truly, if any part of the whole Animal Body deſerves a peculiar Anatomy, it is chiefly due to the Eye, which thô made of a very ſmall bulk, contains in its Structure many admirable things, and is of moſt noble uſe.

But in delivering the Anatomy of this Member, many Authors, both Phyſicians and Mathematicians have already labour'd ſo exactly, that hardly any thing can be added in this buſineſs: but becauſe, thorough the frequent Obſervations from others, made of the ſame thing, and then again from others, an eaſier apprehenſion, and more of certainty, yea, and a more accurate Knowledge is wont to be made; therefore it may be lawful for us, to ſubjoyn here our deſcription of the Eye, not taken from the Writings of others, but by our own ocular Inſpection, and obſervation of the Eye and its parts.

Why the Eyes are two.

We need not here mention that the Eyes are two, that there may be an help provided by one, againſt the loſs of the other; alſo that the impreſſion of the Object may be made more ſtrong, and the more certain, which notwithſtanding does not become double, being prevented by the Coalition of the Optick Nerves, before they are carried to the Common Senſory: nor is it behoveful to play the Rhetorician, by telling that the Eyes are placed like Watchmen, in an high place, and well fortified, from whence they may be able to move themſelves hither and thither, with notable volubility, for the receiving from every part the met with Species, and to direct its Sight every where about: But that we may go about to deſcribe the Fabrick of the Eye, without any Circumlocution; The Parts which belong to it are either Exterior, and as an Orchyard, which ſerve for Ornament, Defence, or Commodity of Action; of which ſort, beſides the round Bone, are the Eye-lids, with the hairs of the Eye-lids, and the Eye-brows, alſo the *Glandulæ* or Kirnels, with the Veſſels, and Excretory paſſages; or its parts are Intrinſick, to wit, conſtituting the Globe it ſelf of the Eye; which are again diſpoſed, either about its Compaſs, as are the Muſcles, and Veſſels, with the fat lying between; or more intimate, which make up its Penetralia or inmoſt parts, to wit, the Coates, and Humours: In each of theſe, we ſhall note what is chiefly worth noting.

The Parts of the Eye are either Exterior.

The Bone, Eye-lids, Hairs of the Eye-lids, Eye-brows, &c.

Or Interior, the Muſcles, Veſſels, Coates, Humors, &c.

For what uſe the Eye-lids ſerve.

Among the outward parts of the Eye, firſt is mentioned the Eye-lids, which are like a Membranous Vail or Covering, and cover or expoſe the Eye as there is occaſion: as often as any injury is coming, theſe moſt ſwiftly hiding their Tenants, defend them; alſo when a relaxation is required from work, and that reſt indulges the Animal Spirits, preſently the Eye-lids ſhut their Windows, like an officious Servant; but when the Spirits are called back to watching, theſe Vails being again opened, the Impreſſions of viſible things are admitted.

They are two in Number.

The Eye-lids are two, to wit, the Upper and the Lower; the motion of this is either none, or very obſcure; yea, it is as it were fixed to the mound Bone, with which the other Upper Eye-lid meeting, cauſes the ſhutting of the Eye to be more firm. The

Upper

Upper Eye-lid, for the double Motion of opening and ſhutting, is furniſhed with two Muſcles, to wit, one ſtrait, which ariſing near the Optick Nerve, with a broad and very thin Tendon, is inſerted into the Margin of the Upper Eye-lid; this Muſcle with its contracted Fibres, lifts up the Eye-lid: The other Muſcle is Circular, which ariſing about the greater corner of the Eye, and from thence encompaſſing the lower Eye-lid, reaches to the Upper Eye-lid, nigh the other corner of the Eye, and coming under it, returns towards its beginning, this Muſcle thus brought about, as it were into an Orb, draws down the Eye-lid, and ſo ſhuts up the Eye.

There are two Muſcles of the Upper.

As to the Nerves which are inſerted into the Muſcles of the Eye-lids, we have ſhown elſewhere, that they are of a twofold Kind, to wit, ſome ariſing from the fifth Pair, others from the ſeventh; by virtue of theſe it comes to paſs, that the motion of the Eye-lids accords with the Soul, and fitly anſwers to all the Paſſions; and that not only in opening and ſhutting the Eyes, for Sleeping and Waking, but in variouſly turning about, and compoſing the Eye-lids themſelves, as is to be ſeen in Weeping, Anger, Joy, Sadneſs, Shame, and other Perturbations; which Kind of Pathetick motions of the Eye-lids, are for the moſt part involuntary, or are perform'd at leaſt unthought of.

With what Nerves they are furniſhed.

By reaſon of the Nerves of the ſeventh Pair inſerted alſo into the Eye-lids, it may be known, wherefore we ſuddenly ſhut, or open, or any other way role about our Eye-lids, at any unaccuſtomed Sound, coming ſuddenly to the Ears. It is ſhewed elſewhere, why the Eye-lids being affected at the approach of Sleep, with a kind of heavineſs or weight, deſire to be cloſed whether we will or no, or thô we ſtrive againſt it; where we treat particularly of Sleeping and Waking.

There is nothing to be obſerved but what is Common, concerning the Hairs of the Eye-lids, and Eye-brows; to wit, theſe hairy Walls or Mounds, like Ramparts, are conſtituted with a double Series or row of noted Pallizadoes, for the defence of the Eyes, by which care is taken before-hand, leſt any troubleſom things ſhould unawares fall into the Eyes, or leſt that any thing ſhould ſlide into them from the Head.

The hairs of the Eye-lids and the Eye-brows.

We will paſs from the Eye-lids to the *Glandula's* or Kirnels of the Eye, which indeed ſtick to their Back, and put forth the Humour belonging to the Eye, thorow proper Paſſages, which lye open within the interior Superficies of the Eye-lids; if that a ſuper-abounding ſerous Humor is poured forth, more than it ought into the Eye, that falling down into a Cavity like a Baſon, nigh the greater corner, enters there two little holes, from which going out into a ſingular paſſage, is carried even to the end of the Noſe, where it is ſent forth of Doors at an open paſſage; beſides, the ſerous Humour in a Man, being plentifully heaped up, nigh to the *Opthalmick* Kirnels, drops forth in Tears.

The Kirnels are two.

Indeed, the Eye leans on theſe two Kirnels, as it were ſoft ſtays laid under its round Cuſhion; one of theſe ſited nigh the greater corner of the Eye, is wont to be called commonly the *Lachrymal* Kirnel, thô the other better deſerves the Name; To this belong Arteries, Veins, and Nerves, alſo excretory Veſſels, which are of two ſorts, to wit, out of this Kirnel, open two or three water-carriers; into the inward Superficies of the Eye-lid; out of which the watry Humor drops forth upon the Ball of the Eye; beſides, two paſſages alſo open into the Ditch of the inner Corner, which carry not thither the Water as ſome think, but ſends forth what is there depoſited, and ſuperfluous, from the excretory Veſſels, and received by them, and then it is carried forth of Doors by one Channel, which going thorow the Bone of the Noſe, paſſes thorow its paſſage. This Channel was firſt found out by *Nicholas Stenon*, who has ingeniouſly deſcribed its make and Uſe.

Their Uſe.

The Lachrymal Kirnel is deſcribed, with the excretory Paſſages.

Its uſe is hinted at.

This little Channel, ſtretched forth from the Kirnels of the Eye, thorow the paſſage of the Noſtril, even to its end, is like a Sink, which ſends forth of doors the ſerous filth, apt to be too much poured forth on the Eye, by a ſecret paſſage: Hence is to be noted, that not only in Weeping, excited thorow Grief, but as often as Tears are preſſed forth from the Eyes, by any thing bitingly pulling them, an humidity diſtils from the Noſe. But as to the Veſſels, which are properly Lachrymal, it is obſerv'd, that three or four *Lymphæducts* or water-carriers, reaching from this Kirnel into the Eye-lid, one of them opens into the Margent of the Upper Eye-lid, another into the Margent of the Lower Eye-lid, with a little Dam raiſed in either, and ſend forth the water in Tears or Weeping between the hairs of the Eye-lids themſelves. I have ſometimes ſeen in an Ulcerous diſpoſition of this Kirnel, a filthy Matter to have dropt forth, by Compreſſion, from thoſe two Lachrymal Puncts.

The Lachrymal Veſſels.

The other Kirnel of the Eye, (commonly nameleſs, but deſerves chiefly to be called Lachrymal) beginning at the leſſer corner of the Eye, leaning on the back of the Eye, under the Upper Eye-lid, is carried forward, almoſt to the inner corner. As to its Figure,

A nameleſs Kirnel rather to be called the Lachrymal.

Figure, it is cleft into many Lobes, distinguished by various distances between; from every one of which, water-pipes ascend into the Eye-lids, and opening thorow the Lachrymal Puncts, within its inward Superficies, pour forth water requisite for the watering the Eye, both for its Motion, and for Weeping: The most Learned Doctor *Stenon*, has clearly and sufficiently described this Kirnel also, with the Lachrymal Vessels, and expres'd them with apt Figures; whatsoever of superfluous Serum sweats forth through the Lachrymal Vessels of this Kernel, slides into the greater corner, for that it is seated in a steep place, and from thence is sent away, through the same excretory Vessels of the other Kirnel, as it were by a common Sink.

The Vessels of the Kirnels.

Besides these Vessels, carrying the water from the Kirnels into the Eye, and the excretory of its superfluous Humor through the Nose; there belong to the Kirnels of the Eye some others designed for other uses, to wit, Arteries, Veins, and Nerves. From the *Carotid* Artery, gotten within the Skull, and about to ascend towards the Brain, a noted branch being sent into the Compass of the Eye, imparts shoots to either Kirnel, carrying Blood to them plentifully: To this Artery (which besides the Kirnels of the Eye, respects also the chief parts of the upper Jaw) is adjoyned a Vein, which reduces the Blood from them; yea, and to both these a Nerve is added for a Companion, to wit, the *Ophthalmick* Arm of the fifth Pair, which variously binds about and knits the sanguiferous Vessels, with many shoots, sent forth in its whole Progress, and also distributes many little shoots into the Kirnels themselves.

The Matter of Tears.

From these we may easily gather, that from the Blood carried thorow the Arteries to either Glandula or Kirnel, a watry Humor, requisit both for the perpetual watering of the Eye, and also occasionally for the matter of Tears, is sifted forth, and there heaped up, for the aforesaid uses. As to the former, these Kirnels, even as others implanted elsewhere, imbibe the Serum carried to them for constant food, to wit, because the Arteries carry the Blood thither more copiously, than the Reins are presently able to sup back; wherefore what is watery is imbibed by the substance of the Kirnel, as it were a Spunge, the bloody Humor being sent away by the Veins. For this reason, because the Nerves bind these Vessels, therefore as often as the Serum abounds too much in the Blood, destinated for the Brain, these Arteries being provoked by the Nerves, and bound together, it is separated or bolted forth, and carried more plentifully than it was wont, towards these Kirnels.

The Causes of Weeping, and the manner of its being made described.

But as to Tears, oftentimes poured forth in great plenty from these Kirnels of the Eye, that it may the better appear, by what means, and for what Causes this is done, it seems very opportune, to discourse concerning Weeping and Crying, and of the Causes and manner of its being made, which yet shall be done briefly and succinctly, because the more full Consideration of these, properly belong to the Doctrine of the Passions. In the first place therefore, concerning Weeping, we observe that it doth chiefly and almost only follow upon great Passions of the Mind, to wit, great Grief, Sadness, Pity, sudden Joy, and the like; to wit, whensoever the sensitive Soul, being struck by either a disagreeable or unaccustomed Object, is as it were compelled inwardly to shake, or to contract more near together its *Systasis*, or Constitution; so care is taken, that a greater company of Spirits, yea and a more plentiful flux of Blood, are compelled to the principal Parts, *viz.* The Heart and Brain, as it were the stays of Life: The Animal Spirits of their own accord leap forward to these places, as to the two fountains of Life, yea and the Blood is more fully heaped up in either; for as much as the blood-carrying Vessels, being bound together straitly by the Tract of the Nerves, drive forward swiftly to these places its Latex, and take it away, more sparingly from thence; therefore, whil'st an occasion is offer'd of Weeping, presently the Bosoms of the Heart, with the whole Neighborhood, swell up and are hugely inflated, by the Blood there heaped together, and (for as much as it is suffused with abundance of Serum) very much boiling; hence, both the Lungs are stuffed up that they can yield but a sobbing respiration; and the *Diaphragma*, that it might give place to their swelling, is depressed lower, with a stronger and more often repeated *Systole*, which is the Cause of Sobbing; in the mean time, for as much as the Air is hardly blown into the Windpipe, the Lungs and the *Diaphragma* being so distended, and at last hardly returned, that mournful sound in Crying or Lamenting is effected. The parts of the Face and Mouth, composed into a mournful Aspect, aptly answer to this Affection of the *Præcordia*; the reason of which we have shewed elsewhere; because the Nerves which Contract the *Præcordia*, are intimate Relations, and rejoyce in a mutual Sympathy, with those, which pathetically Compose the Face, in Laughing and Weeping. But whil'st these things are acted in the *Præcordia* and Countenance, the business is carried no less tumultuously in the Brain; for here the Spirits being acted in Confusion, all things are upside down, and the Brain, by the too great influx of the Blood, is in danger to be either over-

Wherefore a bewailing, is oftentimes joyned Weeping.

turned,

turned, or drowned; which that it might not come to paſs, and that madneſs follow not upon any Paſſion, the Nerves binding about the Truncks of the Arteries in many places, bind them ſtrongly, and ſo repreſs the flowing of the Blood; and its Liquor being at firſt notably rarified, is thickned ſuddenly, and as it were melted, wherefore its Seroſities running forth like a Flood, are diſpoſed into the Kirnels of the Eye, deſtinated for this buſineſs by Nature: Then, becauſe theſe Kirnels are pulled by the Pathetick Nerves, which are of the ſame ſtock, with thoſe of the Face and *Præcordia*, and are ſtrictly bound together, the ſerous Humors, by reaſon of theſe Paſſions of the Mind, being imbibed by the Kirnels of the Eye, are as it were ſtroked out from thence, and ſo diſtil in ſhowers of Tears.

Wherefore Weeping comes upon ſudden Joy.

From hence a reaſon may be had, why Tears are wont to break forth in ſome, after a ſudden Joy, becauſe in great Joy, joyned with admiration, the ſenſitive Soul enlarges it ſelf very much, and diffuſes moſt amply its *Syſtaſis* or Conſtitution; then as it were fearing a Diſſolution, it again Contracts it ſelf; wherefore, in ſuch an Affection, the Blood flowing forth plentifully into the Brain, blows up all the Veſſels, and by reaſon of its fulneſs diſtends them; then after its Channel being thus intumefied, the ſame Veſſels being preſently bound hard together, ſuffers a Flux, and as it were growing liquid, plentifully depoſes its Seroſities into the aforeſaid Kirnels.

Why Mankind only or chiefly Weep.

There remains another Conſideration about Weeping, why Men or Man Kind only, or chiefly in bewailing, are wont to weep, or to ſhed tears? even for the ſame reaſon, which is given for Man's being a viſible Creature, makes him fit for Weeping: To wit, Man is more fitly made for all Affections, and chiefly for the conceiving of Joy and Sadneſs, than Brute Animals; and as he is a ſociable Creature, he ought to Communicate thoſe ſociable things, ſome ſigns naturally implanted in him, to wit, Laughing and Weeping: But as to the Organs, which perform theſe Kind of Affections, we have elſewhere obſerved, that there happens in Man, otherways than in Brutes, a wonderful conſent between the *Præcordia*, and the parts of the Mouth and Face, by reaſon of the Conformation of the intercoſtal Nerve; ſo that as ſoon as ſadneſs poſſeſſes the Breaſt, preſently the Aſpect of the Face, correſponds with the ſame Perturbation.

The Muſcles of the Eyes and their uſes deſcribed.

Thus much for the Kirnels of the Eye, and their Uſe and Action: Among the intrinſecal Parts of this Member, next follow the Muſcles, concerning which, there is ſcarcely any thing rare to be met with, or that has not been already taken notice of by others. It is obvious for any to conceive, that ſo many Muſcles ought to be conſtituted, as there are Kinds of ſpreading abroad, by which this Globe may be moved, as it hangs within the Compaſs of the Bone; for this is made after a fourfold way or manner; to wit, on that ſide and this ſide, upward and downward, and two ways obliquely, *viz.* By bringing it about both towards the outward, and inward corner.

Four ſtrait, two oblique.

For theſe ſeveral Kinds of Motions are conſtituted ſo many diſtinct Muſcles, which are found almoſt in all perfect Animals, and are eaſily ſeen in the diſſection. Four ſtrait Muſcles are inſerted into the Cardinal ſpaces of the Eye, to wit, the Muſcle lifting it up, and preſſing it down, its *Zenith* and *Nadir*, and drawing to, and putting from, as it were poſſeſſing the oppoſite points of the Horizon, to wit, Eaſt and Weſt; the oblique Muſcles compaſs it about like a Sphear, towards the Exterior and the Interior corner. I paſs by here, that the Muſcles of the Eye, do change their Names, according to the Paſſions of which they are Marks; wherefore, that lifting up, is called Superb or Proud, becauſe that in Pride, it holds the Eye elate or lifted up, which however is more true of the Eye-lid, and that Muſcle deſerves rather the Name of Holy and Devout, becauſe it greatly lifts up the Eye in ſtrong Prayer; wherefore it is the manner of Hypocrites, who affect the Habit of Sanctity, ſo to role the Eyes about, that they hide the Pupil of the Eye, and turn up the white to be ſeen: The depreſſing Muſcle, by its action ſhews the mark of an humble, abject, and often of a Pious Mind alſo; that drawing inward, may not be improperly called Drunken, becauſe Drunkards drawing their Eyes towards the inward corner, are wont to look aſquint; and when one Eye is drawn in more than the other, for that by this means the Pole of the Sight is varied, they behold things as if they were double. I knew a young Man, obnoxious to the Palſie, when the drawing in Muſcle was ſtrongly drawn, the other Muſcles of the left Eye being looſe, by reaſon of the Eye being thus diſtorted, every object appeared double, nor could he diſtinguiſh the true one. The Muſcle drawing from or outward, may be well enough called the Indignator, to wit, becauſe in ſuch an Affection, we bend our Eyes outwardly, with a certain averſion. The oblique Muſcles may be called Amatory, becauſe Lovers behold one another obliquely or ſide-ways, and as it were fearing the direct Sight of one another, they role about their Eyes like thoſe of Cattel; hither and thither.

A Conſent, and Sympathy, between them all.

That the Eye might rightly perform the Act of Seeing, there is required a Conſent or Harmonious acting, between all its Muſcles; to wit, that all acting together, may keep and continue its Globe, like the Tube of an Optic Glaſs, in a juſt Poſition for Seeing; for if any Muſcle overcoming its Antagoniſt, acts more ſtrongly than it ought, and draws the Eye too much to its part, preſently the Sight becomes diſtorted; and by this means it is, to wit, by reaſon of overmuch ſtrength of ſome one Muſcle, whether it ſo happens by a Diſeaſe, by Nature, or by an evil Cuſtom, that ſome are goggle-eyed, or have them diſtorted or ſquinting; For ſquinting is wont to be cauſed by the fault of any one of the aforeſaid Muſcles; but eſpecially the Muſcle going about to the inward corner would indanger the bringing in of this Vice, by its exorbitances, unleſs prevented by Nature; for as divers viſible Species, being ſent from Objects at a great diſtance, are received together by the Organ, every one is apt to turn about their Eyes, bending them forward: wherefore Infants, when many things at once are held before their Eyes, eaſily are brought to ſquinting: But leſt this Muſcle, inordinately rolled about, ſhould cauſe in many this Evil, it is prevented with a wonderful Artifice, that its Motion may be ſtill kept within juſt limits; becauſe, near the root of the Noſe is hung a certain handle, like a Pully, which this Muſcle paſſing thorow, there is a neceſſity for it to perform its trajection at a certain Angle, and as it were within a determinate compaſs.

Whence ſquinting comes.

Some Brutes are furniſhed with other two Muſcles.

Beſides theſe ſix Muſcles which Man enjoys, and no more, and which are common to other perfect Animals, as well as him, ſome Brutes are furniſhed with two others for their peculiar uſes. It is obſerved, that four-footed Beaſts, who carry their Eyes prone or hanging down towards the Earth, have a peculiar Muſcle, which holds up the Globe of the Eye, and which ſuſtains it, leſt by its weight it ſhould be apt to ſlip beyond the compaſs of the Bone: with this Muſcle are indued Kine, Horſes, Sheep, Hares, Swine, and perhaps many other Animals, alſo a Dog is furniſhed with this, but has it made after another manner; but to many who have the aforeſaid hanging Muſcle of the Eye, is granted another Membranous Muſcle, which being placed nigh the inward corner of the Eye, when it is lifted up, hides almoſt the whole Globe of the Eye. The uſe of this ſeems to be, that when Beaſts thruſt their heads to feed among high Graſs and Herbs, this Muſcle hides the Pupil of the Eye, leſt any thing ſhould hurt it. The former Muſcle is wont to be called the Seventh of Brutes, and this, that by which Brutes twinkle their Eyes.

The Globe of the Eye, with the Optic Nerve.

After that all the Muſcles, with the Kirnels and the fat lying between, are ſeparated from the Eye, its Globe remains naked, with the Optic Nerve inſerted about its bottom: This Conformation, as we have formerly obſerved of the Brain, is after one manner in Man, and four-footed Beaſts; and after another in Birds and Fiſhes: for in theſe the whole compaſs of the Eye is not round, but depreſſed nigh to the more outward, and the poſterior Superficies; and almoſt like to a Platter or Shield rather; but in the others, being perfectly round, it imitates the Syſtem it ſelf of the World: The reaſon of the difference is eaſily known, by the divers framing of the Eye, which we ſhall ſhow anon.

Its Figure in ſome is round, in others depreſſed.

We meet alſo with another notable difference in the Eyes of divers Animals, about the inſertion of the Optic Nerve, for in Man, a Dog, and other more ſagacious Creatures, the end of the Optic Nerve is placed directly before the Pupil, or is inſerted to the Pole of the Eye it ſelf: for the Beam, or the Optic Pole, paſſing thorow the Pupil or Apple of the Eye, and its middle Cavity, falls into the inſertion of the Optic Nerve; but in a Sheep, a Calf, and many other four-footed Beaſts, and beſides in all Birds and Fiſhes, the inſertion of the Optic Nerve being made in the Den of the moſt inward circular Cave, or ſide of the Hemiſphear, is at a diſtance from its Pole, even as the Pole of the *Zodiac*, from the other of the *Equator*. This difference Dr. *Scheinerus* not perceiving, when he had found the Optic Nerve to be inſerted into the ſide, in the Eyes of great Cattel, Oxen, and Swine, two ſoon concluded, that it was ſo alſo in Man, and in all Creatures beſides; for he ſays in his Third Book, *Fundam. Optic.* p. 11. *That the Optic Pole does not fall into the Optic Nerve, with any Proportion*, the error of which Aſſertion, the Anatomy of a Man's, or a Dog's Eye, eaſily diſcovers.

The Inſertion of the Optic Nerve, is after a divers manner, in divers Animals.

It is placed either in the Pole, or at the Side of the Eye.

If the reaſon of this diverſe Kind of Conformation be demanded, we ſay, that the Primary Organ of the Sight, to wit, in which the Image or viſible Species ſtays, and from whence it is delivered to the firſt Senſory, is not the Optic Nerve, but the *Retina*, netty Coat, or fifth Membrane of the Eye, on every ſide ſpread out, by the Inſertion of the Optic Nerve. Further, the Image projected within the bottom of the Eye, does not conſiſt in the ſmall Punct, neither is it determinated to the ſame individual ſpace, but being variouſly drawn forth, is painted now bigger, now ſmaller, upon the *Retina*, or fifth Coat of the Eye; yet ſo, as being placed nigh to the inſertion of the Optic Nerve, it may preſently be carried by it to the Common Senſory; when as therefore the

The reaſon of the divers Conformation inquired into.

the Optick Nerve is placed in the Pole of the Eye, the Images disposed round about upon the *Retina*, from every part of it, do fill the whole Circle of the painted Scene. But when the insertion of this Nerve, declines from the Pole, to the side of the Eye, the apparition of the Objects stands only below, and not at all above that Punct, and so the whole apparition of visible things, is concluded within a Semi-circle. This is clear to any thinking Person, that it is fit for some Animals, that they receive many Objects at once, at one view, and that others but a few only; therefore the Optic Nerve, for the former, ought to be inserted about the middle of the Eye, and for these latter towards its side. Man, a Dog, an Horse, and perhaps some other Animals, wont to be employed with various Matters, ought to behold all things in the whole Neighbour-hood placed together: but a Sheep, Ox, Hog, and many other four-footed Beasts, and universally Fowls and Fishes, to wit, such whose chiefest task is to get their Victuals, and to defend themselves from Enemies, have no need to behold the whole Horizon, but only things placed near on the right and left hand; altho perhaps in some of these, the paucity of the Objects, is compensated with the sharpness of the Sight.

The Pupil of the Eye in some round, in other longish.

There is observed another no less noted difference in several Animals, about the Pupil of the Eye; for this is round or spherical in Man, a Dog, and in many other four-footed Beasts, in all Fowls and Fishes; but in an Ox, great Cattel, a Goat, and some others, it is oblong, like a great cleft; the reason of this difference seems to be, because that by a Man that is upright, and other Animals that are wont to lift up their heads, and to look round about on every side, many Objects, coming from both above and beneath, and from either side, out of the whole Hemisphear, are received by the Sight; wherefore the Pupil of the Eye ought to be round, that the visible Species sent in from every side, might be admitted in a round form: But Oxen, Cattel, and other Animals, almost always carrying their Heads prone, and hanging down, need only to behold such things as are presented before them, or a little of one side: wherefore, the Pupil of the Eye is depressed, and somewhat long, for the receiving the visible Species, that are only shown at hand.

The reason of this inquired into.

The Colour of the Pupil in some black, in others gray, reddish, or otherways Coloured.

Further, another difference is noted, about the colour of the Ball or Pupil it self, which in Man, and in all Fowls and Fishes is perpetually black, but in four-footed Beasts, it is either grey, or blewish, like the Sky, or of a shining red, or of some other Kind, which colour notwithstanding being fixed, not in the Horney part, but in the Concave of the *Crocoideos*, shines thorow all the Humors into the Pupil.

The reason of this shown.

Concerning the reason of this, we may believe, that those indued with a black Pupil, see more clearly by day-light, because indeed the Image is rendred most perspicuous to the Eye, as it were in a Chamber wholly dark, but by Night they discern little or nothing at all of any Objects; on the contrary, we have observed, those furnished with a blewish, or grey, reddish, or some other shining Pupil, not to see so clearly in the day time, but much better in the night than the former; to wit, because that shining Colour of the Pupil, illuminates something the Cloyster or Optic Chamber of the Eye, that fewer Beams being there gathered together from the darkness they might constitute the visible Image.

The Parts of the Eye, are the Coats and Humors.

These things concerning the Fabrick of the Eye, and its divers manner of furniture, in various Animals, being thus premised, it now remains, that we shew its Anatomy, and that we unfold its several Parts, and the uses of the Parts. We have already mentioned, what also is known to common Observation, that the Eye consists of Coats, and Humors. The Coats or Membranes are as the containing Bodies, and constitute the walls of the dark Chamber, with the little Window, and the Paper for the receiving the Images; but the Humors, are as *Dioptrick* Glasses, so placed within the hole of the dark Chamber, that they aptly break, and gather together, the Beams exhibiting the Images.

The Coats greater or lesser.

The Coats of the Eye, like the Spheares of a Globe, are either Greater, which are stretched forth thorow the whole Compass, or its greatest part; or Lesser, which contain, or include the particular Humors.

The greater are three.

The greater Coats of the Eye are three; which seem in some measure to arise from a threefold Substance of the *Optick* Nerve; for in the Trunk of the Optic Nerve, may be found an Exterior Coat, arising from the *Dura Mater*, with which it is included as with a sheath; Another more inward, cloathing the Membrane, lyeth under this, arising from the *Pia Mater*; and within these Coats are found very many Fibrous Nerves, gathered together into one bundle. But this Nerve, being continued, to the Compass of the Eye, its Exterior Coat being much inlarged, and stretch'd out into a round incloſure, constitutes the outmost Wall of the Eye: This Coat, by reason of its hardness, (because it is strong, and is in the place of a defence against Injuries) is called the *Sclerotick*: The hinder part in most Animals is thick, and spacious, except that in a Dog, and perhaps in

The Sclerotick.

ſome others, it is thinner, and in ſome meaſure clear; but the Anterior part of this Membrane, that it may tranſmit the viſible Species, is tranſparent and ſhining in all. But leſt this ſhould admit more forms than it ought, (by having a too broad, and too large a tranſparent opening) and ſo too confuſed together; another Coat, ariſing from the *Pericranium* grows to it, and covers it; excepting a hole left for the Pupil. This, from its Colour, is called the *Albugina* or the White, for beſides that it determines the aperture of the *Cornea*, or horny or third Pannicle of the Eye, it firmly ties the Eye alſo to the ſides of the bony Compaſs. The additional Coat, or the white Tunicle, beſides the proper Membrane, is made up alſo of Tendons of Muſcles, ſpread into a moſt thin Net; therefore, alſo it becomes white, becauſe, when many diaphanous Membranes are thruſt together, like thin cakes, they cauſe a ſhaddowing, and with it a whiteneſs, as may be perceived in the Bones and Horns of living Creatures, made up of a Pellucid Glew, alſo in the white of an Egg made hard by Boyling.

The Albugine grows to this.

The Figure of the *Sclerotic* Coat, is proportionate to the quality and diſpoſition of the Humors, which are contained in the Eye; wherefore, in ſome (as we hinted before) it is round, in others preſs'd down, but in moſt its Anterior Part ſwells up, above the remaining Part of the Ocular Globe, by reaſon of the Watry Humor underneath, as it were a Portion of the outward Sphear, to wit, for this end, That the Compaſs of the whole viſible *Hemiſphear*, may be received together, by the Eye, as it were by a Convex Glaſs.

The Sclerotic Coat, is in ſome round, and in others depreſſed.

As to the Veſſels which are inſerted into this Coat, beſides the ſhoots of the Nerves, ſent from the fifth Pair, after they have bound about the Trunk of the *Optic* Nerve, they are beſtowed on the bottom of the *Sclerotic*, whoſe Uſe or Office ſeems to be, variouſly to carry the Optic Nerve, with this outmoſt Cheſt or cloſure of the Eye, and to Compoſe it for the receiving the Species; there are alſo granted to this, noted Arteries, from the Trunks of the *Carotides*, before they reach to the Brain. It is obſerved, that the Artery deſtinated for this, falling in, nigh to the Trunk of the *Optic* Nerve, imparts to the ſame, in its whole progreſs, ſome ſmall Shoots, which are certainly ſufficient for Heat and Nouriſhment; then this Artery, ſpread forth at the bottom of the Eye, is divided into ſix Branches, like ſo many little Rivers, all which being brought upon the *Sclerotic*, towards the *Cornea*, divide the Exterior Globe of the Eye into ſo many equal and diſtinct Regions; from theſe, many little ſhoots, going thorow the *Sclerotic*, are inſerted into the *Uvea*, and after a ſort knit this to the other. The Arterous branches and ſhoots, are every where accompanied with Veins, by which the Blood is reduced towards the wonderful Net, and at length into the Trunk of the hollow Vein.

The Veſſels of this Coat.

Within the *Sclerotic* Coat, or the outmoſt Coat of the Eye, follows the *Chorocoeides*, and is almoſt thorow the whole, Contiguous with it, and coheres to it, by ſome Fibres, and blood-carrying Veſſels; this being perforated in the fore-part, leaves an opening for the Pupil of the Eye, which notwithſtanding, as occaſion requires, is wont to be either contracted or dilated. This Coat, being black in moſt Animals, is covered in the Superficies or Convex, or Concave, as it were with a black Paint, which is alſo fixed to the other contiguous Coat; the reaſon of this is, that it might render the inward Chamber of the Eye black or dark: But in ſome Animals, to wit, in moſt four-footed Beaſts, a certain Interior Portion of the *Chorocoeides*, which is turned over the Pupil, ſhines with a diverſified Colour, like the Rainbow, and according to this, the Pupil of the Eye ſeems to be coloured: but as this is wanting to Man, his Pupil is always black, according to the whole Picture of the *Chorocoeides*: But it appears otherways in a Dog, and otherways in a Cat, Ox, and the reſt. In thoſe alſo that have the Pupil round, this Signature is expanded round; thoſe who have the Pupil ſtretched forth at length, like a chink, this Picture being as it were double, ſtands on either ſide of the Optic Nerve: The uſes of this (as we ſaid but now) is to illuminate the Pupil of the Eye, as it were with an inward Beam, that it may be able to behold things by Night, and placed in the dark; wherefore it is very ſhining in a Cat, but is wholly wanting to a Man, Birds, and Fiſhes.

The Coat Chorocoeides.

Is black in moſt Animals but not in all.

A Portion of this, in moſt Brutes, is of a diverſified Colour, otherwiſe than in Man. The reaſon of this is ſhown.

Nigh to the opening of the Coat *Chorocoeides*, ſtands the Rainbow of the Eye, that is, nigh to the outmoſt border of this Coat, where the opening is for the Pupil, a certain Fringe, made up of Nervous Fibres, diverſly coloured and diſpoſed, covers it: Theſe Fibres are called the *Ciliare* Proceſſes, which like brows of hairs, being carried from the Pupil of the Eye, like rays from a luminous Body, are diſpoſed into an Orb; Theſe Fibres being placed in a thick row, are noted with a variegated or diverſified Colour, outwardly, where they ſtick to the Corneous or horney Coat; in the mean time, where they are Contiguous to the brim of the Chryſtalline Humour, and alſo to the border of the *Retine* Coat, they always appear black: Theſe *Ciliare* Proceſſes, do not only dilate and contract the Pupil of the Eye, but alſo they thruſt forward, or draw backward the

The Rainbow of the Eye is deſcribed, and its uſe declared.

Chryſtalline

Chryſtalline humour, and bend it hither and thither into the view of the Objects. Further, there is in theſe Coloured hairs, or the Rainbow of the Eye, a certain vigor, and mighty conflux of Animal Spirits, by the Exertion of which, the Eye ſeems to beam forth, and to caſt forth outwardly certain darts like Lightning, according to the Inſtinct of the Paſſions: yea, hence we ſuppoſe Light to be diffuſed, and to illuminate the Medium; for which reaſon, Men diſcern in ſome meaſure Objects in the dark. I knew a certain Man, indued with an hot Brain, who after a plentiful Drinking of Wine, was able to read diſtinctly, in a very dark Night; the reaſon of which ſeems to be, becauſe the Animal Spirits, being as it were inflamed, and ſo beaming forth from this Rainbow, did illuminate the Medium, with an implanted Beam. Moreover, when by any ſtroke on the Eye, an apparition of flame, or ſhining appears; ſurely this proceeds from a ſudden Concuſſion, and Exploſion of the Spirits, lying within the *Ciliar* or hairy Proceſſes. If it be demanded, by what paſſages the Animal Spirits run into theſe Fibres, we ſay; That from the Nerves of the ſixth Pair, which bind about the Optic Trunk, certain ſhoots, entring the *Sclerotick*, and the *Corocoeidal* Coat, come alſo to theſe Parts; beſides, the *Retine* Coat, which is wholly Nervous, ſticks to this Rainbow.

The ſtrength and irradiation of the Eye from the Rainbow.

The Animal Spirits actuate it very much.

Within the *Chorocoeides* or the *Uvea*, another Coat follows, whoſe Compaſs as it is leſs, ſo it is ſhorter in breadth; for its Border, ſubſiſting about the lower brim of the Chryſtalline Humor, is Contiguous to the lower Border of the Rainbow, and in ſome part ſticks to it: This Coat, as it is white, ſo it is Medullary, and ſaid to proceed from the Medullous and Fibrous Subſtance of the Optic Nerve, ſo that what is there of Nervous Fibres collected into a little bundle, is here like a Veil ſtretch'd forth of a Net-like form. Indeed, if the whole Eye may be taken for the Flower which grows in the Brain, thorow the Optic Nerve as its ſtalk; The *Retine* Coat is the Flower it ſelf, and the two former, but the Stalk and Cup. The *Retine* Coat therefore being ſpread forth within the Chamber of the Eye, or its inmoſt Conclave, is like a white Wall, which receives and repreſents the viſible Species, admitted thorow the hole of the dark Chamber; for doubtleſs this part, however Medullary and Fibrous, and ſo greatly akin to the Brain, and to the Optick Nerve it ſelf, is the proper Organ of Seeing; to wit, on which the ſenſible Species is impreſſed, and from which the ſame is communicated to the chief Senſory; which ſhall more plainly be manifeſted anon, after we have unfolded the Humors of the Eye.

The Retine Coat.

Its deſcription and uſe.

Agreeable to the three Coats of the Eye, there are ſo many Humors of it, to wit, the Watery, Chryſtalline, and Glaſſy: The Chryſtalline Humor ſupplies the place of the Burning-Glaſs, placed within the whole of the dark Chamber, and the two other Humors, conſtitute and fitly determine, the ſpaces only, or places between, which ought to come between the firſt approaches of the beams into the Eye, and the place or Organ of Sight, wherefore this is put behind, the other before the Chryſtalline Humor.

The Humors of the Eye Three.

But this Chryſtalline Humor it ſelf, within the aperture or opening of the *Uvea* Coat, like a Glaſs placed before the hole, gathers together, and breaks the Beams coming thither on every ſide: The Subſtance of this is very ſhining, like glew, or the Gum of a Tree, and is indued with a Conſiſtence like melted wax, yet if preſſed it will not willingly flow forth. Its Figure in Man, and moſt four-footed Beaſts, comes near to the ſhape of a Lentil, whoſe utmoſt Superficies is more plain, and the innermoſt more gibbous or bunching out; but in Fowls and Fiſhes, its Figure comes near to a Spherical ſhape; In theſe later, where the Chryſtalline Humor is round, the whole Figure of the Eye is depreſſed in either; But in the other, where the Chryſtalline Humor is of a depreſſed Figure, the Eye is found to be plainly Spherical. A reaſon of the Conformation of either, ſhall be ſhown afterwards: The Chryſtalline Humor, thô not apt to flow forth, yet is included with a proper little Membrane, for the Lightneſs of it, called the Cobweb.

Chryſtalline.

Its deſcription and uſes.

In Man, and in four-footed Beaſts, thô the Chryſtalline Humor be of the form of a Lentil, it doth not bear out enough, ſo as it might receive the Beams of the whole Hemiſphear, therefore the watery Humor is lay'd to it, as an addition, which thruſting forth the Cornea, or horny Coat, and rendring it more bunching out, encreaſes outwardly the Convexity or bending forth of the Eye, which is indeed, that the viſible Species might be from this place, and from that, and on every ſide more plentifully admitted into it, as into a Window, made forth or butting out beyond the plane of the Wall. Further, the watery Humor ſwelling forth with the horny Coat, breaks a little the oblique Beams falling towards the Perpendicular; and ſo compelling them nearer together, directs more together into the Convexity of the Chryſtalline ſwelling. There is yet another uſe of this watery Humor, to wit, to temperate the Beams paſſing thorow

The watery Humor, and its uſes deſcribed.

thorow it, being ſometimes ſomewhat fiery, and ſo to render them more proportionate to the Senſory.

The glaſſy Humor. On the other ſide of the Chryſtalline Humor, to wit, on the back of it, the glaſſy Humor ſtands, like to fuſed Glaſs; this, much more plentiful than both the other, poſſeſſes the greateſt part of the Optic Chamber; alſo, being leſs Compact in it ſelf, is apt ſomewhat to flow out, and is included with a moſt thin little Membrane: this lyes upon the *Retine* Coat, and contains the Chryſtalline within its Boſom. *Its uſes.* Its Primary uſe is to ſeparate the *Retine* Coat in a juſt ſpace from the Chryſtalline Humor, that after the Beams have paſt thorow this, as it were thorow the Burning-Glaſs, with a due Refraction, they may have in that, placed at a juſt diſtance, their habitation: Hence, in thoſe who have the Chryſtalline Humor in the form of a Lentil, and ſo the Beams paſſing thorow, can't come together but at a greater diſtance, have great plenty of this glaſſy Humor, and its plenitude cauſes the Spherical Figure of the Eye; But in thoſe, who have the Chryſtalline ſwelling round, that the Beams paſſing thorow, are more crooked, and have a dwelling or neſt at a leſs diſtance, the quantity of the glaſſy Humor is found leſs; and its defect cauſes the depreſſed Figure of the Eye, or of the form of a Cheeſe. *The Plenty of the glaſſy Humor varies, according to the Figure of the Chryſtalline Humor.* Further, the glaſſy Humor, according to *Scheinerus*, being ſomewhat a more thin Medium, than the Chryſtalline Humor, breaks a little the Beams paſſing thorow, from the Perpendicular, and therefore ſomewhat enlarges or draws forth the Picture of the viſible thing, otherwiſe more contracted, and ſhews the ſame more conſpicuous in the *Retina*. Thus much concerning Seeing, and of all the Senſes; in the next Chapter, we ſhould ſpeak of the other Power, to wit, the Locomotive: but being we have formerly largely diſcourſed concerning that; we ſhall handle in the following, certain Affections, belonging to the Corporeal Soul, as to the Exerciſe of the Motions and the Senſes, to wit, Sleep and Waking.

CHAP. XVI.

Of Sleeping and Waking.

Sleep Neceſſary for all Animals. SUch is the weak and inſtable Nature of all living Creatures, that they are not able, neither to Live perpetually, nor to Act and Labour continually; but that there is a Neceſſity for them (even as once, and at laſt to dye ſo) daily to repeat frequent turns of Sleep, as it were ſo many previous Monitors of Death. Though we have not experienced it, we eaſily know what it is to dye; to wit, when the vital Flame, like a Lamp, is either by degrees conſumed, or violently extinguiſhed, preſently Heat and Light, and what flow from them, both all the Vital and Animal faculties, are aboliſhed. But what is the formal Reaſon, Eſſence and Cauſes of Sleep, which we ſuffer, and daily experience, is almoſt wholly unknown. Concerning this, there are various Opinions, both of Ancients and Moderns, but they rather ſeem Dreams, than ſatisfactory Reaſons: To wit, *What it is unknown, or greatly Controverted.* whil'ſt ſome affirm Sleep to be mere Privation, others a Bond of all the Functions; theſe place for its Cauſe a retraction, or introceſſion of Heat, thoſe an aſſent of Vapours from the Stomach to the Head. Some aſſign for the ſubject the Brain, others the Heart, others the Stomach, and Spleen; and ſome again the Soul, others the Body by it ſelf; and laſtly, others both together, to wit, the whole Animal Body.

The Opinion of Schneiderus. Among the latter Writers, *Conradus Schneiderus* hath of late been Eminent, who rejecting the Opinions almoſt of all others, and aſſerting Sleep not to be produced from Vapours, nor from any material Cauſe; nor to depend, either upon any affection of the Brain, or of any other part; affirms it to be, and Waking alſo, mere faculties of the Soul; to wit, innate, or born in it, and wholly inorganical. *He affirms Sleep to be an inorganical faculty of the Soul.* Alſo he ſaith, that the formal Reaſons of either are, that the Soul, or its animadverſive Faculty, ſometimes withdraws, and as it were hides it ſelf; and ſometimes puts forth, and expunds it ſelf. This Opinion, thô in ſome part it ſeems likely, does not eaſily deſerve our aſſent, becauſe, notwithſtanding he aſſerts Sleep and Waking to be proper Faculties of the Soul, and theſe inorganical and independing of the Body, he further ſuppoſes, other chief Powers of the Soul, to wit, common Senſe, Memory, and Appetite, not to be performed from the divers Organs within the Brain, nor to be diſtinguiſhed by their Seats, but to be diffuſed thorow the whole Body.

Therefore,

Therefore, that we may the more rightly Philoſophize concerning Sleep, we ought to conſider, what are its Subject, formal Reaſon, Cauſes, Differences, and Effects.

The Subject of Sleep, not the whole Body.

First, As to the firſt it clearly appears, that Sleep is not extended neither to the whole Soul, nor to the whole Body: for the *Præcordia*, and Organs of reſpiration, are exerciſed with a perpetual *Syſtole* and *Diaſtole*, the Viſcera, dedicated for Concoction, perform their Offices more, and better in Sleep than in Waking: Further, when as the aforeſaid Parts are wont to alter their actions, according to the urgencies of evident Cauſes, (as may be argued by the Pulſe and reſpiration variouſly changed, alſo from Vomiting, and ſometimes a ſudden looſning of the Belly) the exerciſes of the ſenſitive Power, as well as the Motive, ought to be granted to them in Sleep: But the Blood is circulated, and flames forth in quiet, the nouriſhing and Nervous Humors are diſpenſed, yea, and the ſuperfluous, and what is excrementitious, are beſt ſeparated or put forth: Hence, as it appears, perpetual watches are kept about the midſt, or inmoſt part of the Animal Body. In the mean time it is obſerved, that Sleep urging, all the External Senſes are ſhut up, alſo that all Spontaneous Motions whatſoever ceaſe; ſo that the Bodies being wholly ſubjected to eaſe, lye as they were dead. Further, the Internal Powers, related to theſe, ſuch as are the Common Senſe, Phantaſie, Memory, Appetite, conſpire together with theſe External Powers, and either wholly omit their Acts, or exerciſe them but obſcurely and confuſedly.

The Animal Spirits are the immediate Subject of Sleep.

From theſe it may be plainly gathered, that the Animal Spirits, which are the next or efficient Inſtrument of Senſe and Motion, are alſo the immediate Subject of Sleep; but, not all of them, but ſome Bands, as it were of a Superior Order, at thoſe times keep Holy-day; but others, whoſe task is more aſſiduouſly required, for the Preſervation of Life, are wholly inhibited.

All the Spirits enjoy reſt, but not in Sleep.

Concerning theſe, that the reaſon of the difference may appear, and that the bounds of Sleep may be defined, we muſt note, that there is need for all the Animal Spirits (which conſtituting the *Hypoſtaſis* of the Corporeal Soul, perform all its Functions) becauſe they cannot inceſſantly exerciſe, or ever continue their Acts, to have frequent intermiſſion; by which, being worn out and tyred, they might be refreſhed: notwithſtanding there is not granted a Vacation or reſt to the Spirits of every Regiment, after the ſame manner, nor in the like dimenſion.

The Spirits only ariſing from the Brain, and who are the Authors of voluntary Functions enjoy Sleep.

For the Animal Spirits, which being born within the Brain, there conſtitute the chief Faculties of the Soul, and from thence flow into the Nervous ſtock, for the performing of the Spontaneous Acts of Senſe and Motion, and effect the more hard and laborious tasks, are not tyed to the continual performance of them, but are permitted, after hard labours, to lay aſide their work, and as it were to be idle; ſo that the Privilege of Sleep properly pertains only to theſe. But as to the Animal Spirits of the other Kind, which being procreated within the Cerebel, and there receive and emit the Inſtincts, and forces of Senſe and Motion, merely Natural; and from thence flowing into the *Præcordia* and *Viſcera*, perform the more aſſiduous Offices of the Vital and Nutritive Function; I ſay, that the Labours of theſe are more eaſie, and leſs laborious; but as they are abſolutely neceſſary for the preſerving of Life, that they ought not almoſt at any time to lye ſtill, therefore the aforeſaid Spirits, being buſied about theſe Offices, are not ſuffered to keep Holy-day long, and to indulge themſelves with Sleep, but it is ſufficient for them, to intermit their tasks for a ſhort ſpace, and preſently to reſume them, and ſo to have, inſtead of a longer Vacation, ſome broken times from their Labours: as chiefly appears from the pulſe, and breathing, in which the times of motion and of reſt, are reciprocal, and almoſt equal. Indeed the Spirits performing theſe tasks, ſeem as if condemned to the Stone of *Siſyphus*; to wit, that they ſtill lift up the ſame burthen, then reſting whil'ſt it ſlides down again, they preſently, and ſo perpetually, repeat their Labour. Further, whil'ſt that the Animal Spirits influencing the *Viſcera* of Concoction, propagate the Acts of Vermiculation, from Part to Part, receive and give place to motion, and reſt mutually in themſelves; which alſo is more amply performed when we Sleep ſoundly; in ſo much, that ſometimes the work of more difficult Concoction, is not to be done but in Sleep. Therefore the Empire of Sleep chiefly and almoſt only belongs to the Animal Spirits, inhabiting the Brain, and the Executors of the Animal Function there, (of whoſe Acts we are knowing) and in the Appendix both Medullary and Nervous. If thoſe Spirits ariſing from the Cerebel, as influencing ſome Pathetick Nerves, to wit, of the fifth and ſixth Pair, ſeem to participate of Sleep, that happens by a conſent, deliver'd from the Brain; to wit, by which the Commands, as of Motion, ſo of reſt are conveyed to them.

Not thoſe Procreated in the Cerebel.

The immediate Subject of Sleep, is the Knowing Part of the ſenſitive Soul.

We affirm, That the immediate Subject of Sleep, is the greater Portion of the ſenſitive Soul, which being rooted in the Brain, and thence diffuſed into many Parts of the Body, is the Author of every Spontaneous Motion: But the Mediat, the Brain it ſelf, and

and all the ſenſible and moving Parts, which Communicate with it. Alſo, on the contrary, the other leſſer part of the ſenſitive Soul, which being rooted in the Cerebel, and thence ſtretched forth into the *Præcordia*, *Viſcera*, and ſome other Bodies, is the Parent of the Vital and merely Natural Function, to wit, of whoſe Acts the Animal is not conſcious, is freed from the Bonds of Sleep.

The Mediate are the Bodies containing it.

The formal reaſon of Sleep.

From theſe, that we may proceed to deliver the formal Reaſon of Sleep, let us conceive, that this greater portion of the ſenſitive Soul (the Animal Sleeping) doth lay aſide its expanſion like a Veil, ſinks within it ſelf, and hiding its head, as it were within its own Boſom, ſees nor cares for nothing, that is without; ſo that both the Emanation of the Spirits into the globous Part of the Brain, and alſo their irradiation, into the Nervous ſtock, ceaſing; the Act of ſpontaneous Senſe and Motion, both outwardly and inwardly, is ſuppreſſed.

The beginning of Sleep, is in the Cortical part of the Brain, which is alſo the ſeat of the Memory.

If it be demanded, in what Part or Region theſe Spirits dwell, who firſt of all poſſeſs Sleep, and begin to be indulged with reſt, before any others, it may be well ſuppoſed, that the Spirits firſt Sleeping, are thoſe, which flowing within the globous part of the Brain, create the Acts of the Fantaſie and Memory. To wit, theſe, either of their own accord, or by reaſon of the incourſe of Strangers, falling down from the Pores of the Exterior Brain, in which they were wont to expatiate, convey themſelves into its more deep Marrows, or middle Parts, where as it were lying down idely, intice the Spirits there implanted to the like ſlothfulneſs; and from thence flowing into the Nervous ſtock, recall others from their Efflux, and ſolicite them to idleneſs. Indeed, the Spirits irradiating the outer Brain, do firſt of all grow ſtupified, and begin Sleep in their receſs, as appears from hence, becauſe there is a Neceſſity, for theſe ſometimes to be repreſſed from their expanſion, and to be driven inwards, that there may be a place left, for the inſtilling the Nervous juice, or matter for new bands of Spirits, into the Brain; wherefore, thoſe veterane, or old ones, being not only wearied, go from their Station, but being as it were drowned by the Humor, plentifully ruſhing in, are compelled from their watches.

The Cauſes of Sleep: Firſt, what the final is.

From theſe things it will not be difficult to aſſign the Cauſes of Sleep; and firſt, that we may begin with the Final; (which is always the Key to the reſt) If it ſhould be demanded, for what end, the Animal Spirits going out of the globous part of the Brain, into its middle or marrowy Parts, are bound up with chains of Sleep, and ſo after a ſolemn manner, alter the viciſſitudes, as of Exerciſe, ſo of Reſt; this eaſily occurs; that the Animal Spirits (at leaſt thoſe who are wont to be more ſtrongly exerciſed) leſt they being wholly looſned ſhould periſh, and break the *Hypoſtaſis* of the Soul, want for the ſuſtaining of themſelves a twofold prop, to wit, Reſt and Food; by the former care is taken, leſt the Spirits, for that they are highly volatile, ſhould be very much drawn aſunder, by too much Occupation, and acted into Confuſion: wherefore, after that they have long and much laboured, they deſire to reſt, and be at quiet of their own accord; then by the other, to wit Food, the waſtings both of themſelves, and of the ſpirituous Liquor, with which they are waſhed, are repaired; therefore needful for them: But both theſe benefits, requiſit for the Spirits, to wit, their ſedation and refreſhment, are granted (and almoſt only) to Animals in Sleep. For althô in Waking, pleaſant ſenſible Objects do ſomething pleaſe the Spirits, and that the nouriſhing Liquor, ſupplied from Aliments newly received in, may ſomething cheriſh them, yet a fuller refreſhment, and quieting, by which they are ſufficiently fortified, for the lively performing the Animal Functions, are not obtained but in Sleep; for then the Spirits being at leiſure for ſome time, from Motion, get to themſelves new ſtores; and in the mean time the Brain, like a dry Sponge, imbibing moſt greedily the nutritious Liquor, takes it for Proviſion for it ſelf; which after a little ſpace, it diſpenſes to the ſeveral Parts, both of its proper Regiment, and alſo of its Appendix; yea, plenty of the Spirits, and their food, being ſomewhat exhauſted, the Brain, as it were another Stomach, ſeems to be hungry after Sleep, greatly to deſire it, and not to be ſatisfied, unleſs it daily enjoys it, and that in its wonted meaſure: for in the ſpace of every Night, there is a certain Neceſſity of Sleeping for ſo many hours, as we have formerly accuſtomed our ſelves to; if at other times, as after Eating, an evil Cuſtom indulges Sleep, we afterwards more hardly want it, than our Dinner; for the privation of due Sleep, or what often accuſtomed to, is as it were a faſting to the Brain, by which, if long affected, that, and its Nervous Appendix, languiſh as it were for hunger.

To wit, a refection and quieting of the Spirits.

The formal Cauſe of Sleep, conſiſts in the Reſt of the Spirits, and in the watering of the containing Parts.

Therefore, for the taking of Sleep, by which the Brain may be filled, with the Nutricious Humor, and the Spirits, wearied or exhauſted by Motion, may be refreſhed, a certain Law of Nature, or Neceſſity is incumbent upon us, and calls it upon us oftentimes againſt our Minds: But this kind of Diſpoſition being innate to moſt Animals, and chiefly to Man, whoſe Spirits are moſt of all employed, is the Final or *Procatartick*, or more remote Cauſe of Sleep; but its formal or Conjunct Cauſe, conſiſts in theſe two things,

things, *viz.* in the Vacation or Reſt of the Spirits, and in the Irrigation or watering the Parts containing them; by which (as common to either Affection) a relaxation follows, from a Tenſity or Inflation of the Brain, and Nervous Parts.

The evident Cauſes.

As to the evident Cauſes or occaſions, by which Sleep is wont to be introduced, firſt we muſt diſtinguiſh concerning Sleep; That it is either Natural or Ordinary, which every one enjoys daily, for ſo many ſet hours, and its acceſſion and duration depends upon either Conjunct Cauſe exiſting together in Act, *viz.* at the ſame time, the Spirits remitting their tasks, ſink down, and the nouriſhing Humour flows into the Brain; then this being ſufficiently watered, and they refreſhed, Waking returns: Or Sleep is not Natural or Extraordinary, which for ſome occaſions follows in an undue meaſure, and inconvenient time. Concerning preternatural Sleep, we ſhall ſpeak more properly of it in another place; when we ſhall treat of Soporiferous or Sleepy Diſeaſes. But as to the Non-natural, we have obſerved; that it is of a double Kind, according to the Complication of the Conjunct Cauſe; For either the Spirits firſt lye down, and ſo the Brain imbibes more copiouſly the appoſite Liquor; or firſt the Brain is too much moiſtned with Humor, and ſo the Spirits being as it were drowned, are forced from their watches. For when the Blood every where waſhes the Cortex of the Brain, by almoſt innumerable Ramifications of Veſſels, a certain ſpirituous Water from theſe bloody Rivulets, always ſtands at the Door, and is ready to be inſtilled into the Medullar Subſtance of the Brain; which, for as much as it is copiouſly received within, preſently overwhelms the Spirits, and obſtructs their paſſages, and ſo Sleep being call'd upon, every Animal Function ceaſes for a time; yet, leſt this ſhould be too frequently and untimely done, the Animal Spirits, ſo long as they are lively and active, inflate the Subſtance of the Brain, and keep it extended, ſo that the Spirituous Liquor, which is alſo Soporiferous, is not admitted, but only in a ſmall quantity, ſuch as may ſuffice for the exciting of Sleep. But if either the Spirits being weary lye down of their own accord, or are compelled by the boyling Blood coming impetuouſly to the borders of the Brain, to give place to it, the aforeſaid Liquor, ruſhing in on heaps, produces almoſt invincible Sleep. Wherefore, according to which, either the Animal Spirits open the doors of the Brain of their own accord, or the Nervous Liquor beſieging them, impetuouſly breaks thorow; The *Prophaſes*, or evident Cauſes of Sleep, are of this or that rank: there are many Kindes of both of theſe, and ways of being done, the chief of which we ſhall briefly touch upon.

Sleep either Natural, or not Natural, or Preternatural.

Sleep not Natural, ſometimes begins, from the Spirits being brought low.

Sometimes from the Cortex of the Brain being too much watered.

For what Cauſes the Spirits lye down of their own accord.

The force of Cuſtom.

Firſt, In the firſt place therefore, there are many Cauſes, for which the Animal Spirits begin of their own accord to keep Holy-day, among which, the force or power of Cuſtom obtains the chief place. For when we have accuſtomed our ſelves to Sleep at certain ſet hours, the Spirits about the ſame time, as it were diſmiſſing the force of their Motion, leaving preſently all work, and External Commerce, retire inward, and indulge themſelves with Reſt: The reaſon of which is, becauſe the ſenſitive Soul, for as much as it is void of all Science, and proper direction, determinates this or that thing to be done, by outward Accidents and Circumſtances; wherefore, the Animal Spirits, in what path they are once led, unleſs they be hinder'd, will repeat to an hair their former tracts. Hence it is, that we both Sleep, and alſo Awake, at ſet and wonted hours, alſo we expect and hardly can paſs by, the ſame times of Dinner and Supper. So ſolemn the manner of Nature is to do the ſame thing which it did before, and till being taught new things, it is the manner of its Government, conſtantly and exactly to obſerve the old. An Example of this Kind of Natural aſſiduity is admirable, which was told me for certain, of a Fool living ſome years in our Neighborhood; who, thô he were ſilly and fooliſh, yet did he know exactly, without any ſign, the interſpaces of the Hours, and as often as the ſpace of an whole Hour was elapſed, as if he had been a living Clock, he would preſently perſonate the like Number of the Hour, with ſo many hoarſe ſounds, and no buſineſs or employ about any other occupation, could make him omit this Task. He at the beginning was wont to imitate aloud, by making a noiſe, every ſtroke of the ſounding Clock; and as often as he heard the ſounding of the Bell of the Clock, preſently he cry'd, *One*, *Two*, *Three*, &c. repeating ſucceſſively the ſeveral Pulſations; hence it hapned afterwards, that the Animal Spirits, by daily imitation, being accuſtomed to be ſtirred up, to ſuch a Motion, according to the ſet ſpaces of Time, at length they were able to diſtinguiſh the ſame Periods of their own accord, nothing directing, as if the ſliding ſpaces of time, had been meaſured out by the wheels of a Clock.

A notable Example of Natural Cuſtom or Aſſiduity.

Secondly, The Animal Spirits being wearied by the hard labour of the Body, or too ſerious intention of the Mind, indulge themſelves with Sleep of their own accord: For when after immoderate exerciſe, by reaſon of Heat and Sweat flowing forth, the Spirits plentifully exhale, and thoſe which are left being as it were poured forth and diſtracted one from another, as ſoon as thoſe have left them, they preſently lay aſide all work, that they may Concentre themſelves within, and recollect their forces; for the

2. *The Spirits being weary, lye down on their own accord.*

like reaſon, after vehement ſtudy, or long Contention of the Mind, by reaſon that the Animal Spirits become very much tyred, we grow Sleepy; yea, ſometimes ſerious Meditation, and when imployed with Hearing (chiefly of Sacred things,) and great Attention, procures an invincible Sleep; the reaſon of which is, not that the Spirits are ſo much conſumed or wearied, but becauſe they are gathered together in two great heaps in the Brain; and ſo with them too great plenty of the Nervous Humor is poured in, whereby the Brain is overflowed: Hence alſo it is, that if preſently after Eating, Reading or Philoſophical Lectures be attended to, they ſhall cauſe Sleep ſooner than an Opiat; to wit, becauſe theſe more grave Exerciſes of the Mind, both convey more plentifully to the Head, the Blood; and at the ſame time the Spirits Concentre together on every ſide towards the middle Part of the Brain; wherefore, from the Blood coming to its border, a mighty heap of Nervous juice is admitted in; by which the Spirits are preſently overturned, and their ſpaces ſtuffed up; the contrary happens, as often as any one after a full Banquet ſhall go to the Theatres, to ſee Plays, for the Spirits being ſtretched forth by delectation, blow up and diſtend the Brain, ſo that the coming in of the Sleepy Humor, thô heaped up at the Door, is kept out.

The pleaſing of the Senſes, and the Phantaſie, cauſe Sleep.

Thirdly, We may obſerve, that the Animal Spirits, when delighted with a ſoft Harmony, are invited inwards from the Organs of the Senſes, and being there recreated, ſlide into Sleep. So a certain Muſical and ſoft modulation of the Voice, the gentle murmur of Waters, the ſoft whiſpering of the Wind, alſo pleaſant Fancies, as when we Imagine our ſelves to be in a green Meadow, or ſplendid Houſes, becauſe by this means, the Spirits gently Concentre together, Sleep is wont to creep upon one.

The Spirits are Compelled into Sleep, by Narcoticks.

Fourthly, There remains another manner of introducing Sleep, to wit, when the Animal Spirits are oppreſſed by *Narcoticks* or *Opiats* taken inwardly, or applied outwardly, and ſo are inhibited the exerciſe of their Function. For *Opiats*, becauſe they Poiſon the Spirits, extinguiſh their forces, as Water poured upon Fire, or Sulphur laid on the Kitchin Fire, and cauſe a *Torpor* or Numneſs; wherefore, if they are more largely taken, that they cannot be overcome by the Spirits put to flight, who by little and little being recollected, renew the *Syſtaſis* of the Soul, a deadly or perpetual Sleep follows.

Their Penury or want perſwades to Sleep.

Fifthly, To this rank ought to be referred the Penury or evil Conſtitution of the Animal Spirits; for when they are either deficient in Plenty, or are dull and Torpid, that they can neither tolerate daily or hard Exerciſes, nor actuate the Brain, nor defend it againſt the Inundations of the ſerous Humors, from thence are wont to be induced a Torpor or Numneſs, and frequent Sleepineſs of the Animal Faculty; as is to be obſerved in Dropſical and Scorbutical People: but the Conſideration of this Kind of Torpor, we ſhall refer to another place, where we ſpeak of Soporiferous Diſeaſes.

By what, and how many ways Sleep begins from the Brain, firſt affected.

2. Another Kind of evident Cauſes, by which Sleep is introduced, conſiſts in this, that the Brain is firſt affected; then by its Conſent, the Animal Spirits being half overthrown, betake themſelves to reſt; theſe Kind of Effects are chiefly brought in when an heap of Serum is poured in upon the Brain from the Blood too much ſtuffed with a watery Humor, which watering it with too much moiſture, ruſhes overs its Pores and Paſſages, and as it were drowns the Animal Spirits flowing in them. Such an Inundation of Spirits is produced, either from a too great taking in of Food, whence the Blood ſwelling up above meaſure, with the nouriſhing Humor, too much puts down upon the Brain the plentiful proviſion of Nervous Juyce; wherefore, preſently after a more full feeding or drinking, men become Sleepy; or alſo, the Blood, as to its Temper, being made more watery, moiſtens the Brain, as it were with a perpetual ſhower, and ſo renders thoſe affected continually Sleepy; as is wont to come to paſs ordinarily in Dropical and Scorbutical People. To theſe may be added, and oftentimes is partly the Cauſe, the imbecillity or weakneſs of the Brain, and the looſeneſs of its Pores, ſo that, they gaping too much, moſt eaſily admit the ſerous heap, whereby Sleepineſs is brought in. For it is obſerved, That Drunkards, eſpecially ſuch as drink Wine, fall aſleep with it, on the leaſt occaſion, and not only become Drunk, but alſo Drowſie or Sleepy. The reaſon of which is, that when the paſſages of the Brain, are more often and untimely unlocked, with the Particles of the Wine, at length become ſo feeble, that the Blood growing hot above meaſure, pours forth its Recrements upon the Brain, and ſo cauſes from thence a torpor or ſtupidneſs therein.

When its Compaſs is overflow'd, by the Serum coming to it.

To which may be added, the imbecillity of the Brain, and looſneſs of the Pores.

Sleep not from fumes or vapours.

Theſe are the chief means, whereby Sleep is effected, when it is excited, by reaſon of the overflowing of the Nervous juyce, and as it were the over-turning of the Animal Spirits. But as to theſe, it hath been far otherways taught, by the Opinion of the Vulgar, to wit, that fumes and vapors are raiſed up from the Chyle, or Humors growing hot within the *Viſcera* of Concoction, which cloud the Brain, and ſo cauſe a Numneſs. But this Opinion eaſily falls, ſince the Circulation of the Blood, and the more plentiful Suffuſion of it on the Brain, have been known; and that the rather, becauſe a paſſage

from

from the Stomach into the Head, thorow ſo many Inwards, and bony Cloyſters, like ſtops, ſeem impervious, or not paſſable for the ſending up of fumes. Without doubt, much the greateſt part of the Humor, with which the Brain is watered, and the Spirits inhabiting it, over-turned, during Sleep, is carried by the Arteries, and diſtilled in immediately from the Maſs of Blood. But althô we deny vapors elevated from the Stomach to the Head, to cauſe Sleep, yet by reaſon of ſome affections of the Ventricle, it manifeſtly appears, that Sleepineſs is induced; for as much as Opiats being taken, they begin to operate oftentimes preſently, and before the virtue or any of their Particles can come to the Brain, by the paſſage of the Blood. This alſo appears, becauſe we become Sleepy from more groſs Meats, and of ill Digeſtion, which ſtay long in the Stomach, and burthen it. The reaſon of which ſeems to be, becauſe, when as the Corporeal Soul, or a principle portion of it, is the immediate Subject of Sleep, and ſhe entertains it, for as much as being reſtrained from Expanſion, and as it were drawing a Curtain, ſhe enters into her ſelf, and ſinks down on every ſide, towards the middle of the Brain; we ſay, that ſuch a ſubſiding of the Soul, or its chiefeſt part, thô done in the Brain, is oftentimes excited, by reaſon of the Cauſe lying hid in the Stomach; becauſe there is a mighty Sympathy, between this and that; or rather, the Animal Spirits, inhabiting the Ventricle, althô ariſing from the Cerebel, conſpire ſo intimately with the deſiring or knowing Soul (which is the Inhabitant of the Brain) that they are able to bend, exalt, depreſs it every way. The Appetite of neceſſary or delicate food, ſnatches it from any other propoſition or deſire. The fruſtrated longing of big-belly'd Women, cauſes an Abortion, or a Monſtrous Birth. At the firſt taſte of a draught of Wine, before the Liquor can be carried into the Blood, it lifts up and wonderfully chears the drooping Soul. In like manner on the contrary, Opiats or Sleeping Medicines, becauſe they ſtupifie or mortifie the Animal Spirits, implanted in the Stomach, bring preſently a Torpor to the Knowing part of the Soul, and ſometimes an extinction to its whole *Hypoſtaſis*, both ſlamy and lucid: For the ſame reaſon, undigeſted Aliments, becauſe they fix and burthen the Spirits inhabiting the Ventricle, render the others Preſiding in the Brain, for ſome time Dull and Torpid.

The Matter of Sleep, conveyed only by the Arteries.

Why raw and indigeſted meats induce Sleepineſs.

That happens by reaſon of the Conſent, which is between the Stomach and the Brain, and which it has with the whole Soul beſides.

How Opiats Cauſe Sleep, whilſt they operate in the Ventricle.

But ſleep ſeems to begin not only from the Ventricle, but for the moſt part from the Eyes; for when about to Sleep of our own accord, we our ſelves firſt of all ſhut our Eyes, & our Eyes being made heavy, and dull, Sleep creeping upon us whether we will or no, love to be cloſed; yea, if we would watch longer, we rub our forehead, and Eye-lids, and open them with a certain force, as if about to caſt off Sleep chiefly there ariſing. Concerning theſe, we may ſay, that reſt, being about to be indulged to Animals, may be the leſs diſturbed, Divine Providence hath ſo provided, that the Windows being preſently ſhut, the meeting with External Objects may be hindred. The Eyes ought to perform this Office eſpecially, as the moſt noble Senſory; alſo that they may more certainly perform it; whil'ſt the Knowing Soul withdraws it ſelf, and Contract its Compaſs, the Spirits being recalled towards the middle of the Brain; the Sight, as the Organs of the other Senſes, are deſtitute, and left flaccid and apt to fall down; and this happens chiefly and more certainly to the Eyes, becauſe Sleep coming on, the Brain becoming full and ſwell'd with the flowing in of the Nervous juyce, at that time more uberous or plentifully abounding, very much preſſes upon the Optic Nerves, and thoſe moving the Eyes, lying under its baſis with a long paſſage, (different from any others) and ſo hinders the wonted inflowing of the Spirits into the Senſory of Sight.

How Sleep ſeems to begin in the Eyes.

Thus much for the Nature, Cauſes, and the various ways of inducing of Sleep; there yet remains for us to conſider of the chief Effects and Alterations of it, which it is wont to bring to Soul and Body, and their Parts and Humors, and firſt, what it brings to the Vital or Flamey part of the Soul, radicated in the Blood.

Of the Effects of Sleep.

1. Towards the Vital or Flamey part of the Soul.

Concerning this, firſt of all we ſhall note, That the Blood is more inkindled, and much more plentifully burns forth in Sleep, than in Waking: the Truth of this is plain, from the ſtanding Obſervations of ſuch as have given it for Law, that Men Sleeping, exhale or breath forth a departure of a far greater weight, than Men Waking, thô they uſe Exerciſe and Sweat. Moreover, Reaſon and Experience dictate the ſame thing, for as a Combuſtible Matter, being placed near the Centre of inkindling, and heaped about it, burns more than if the ſame being divided into parts, ſmoaking and half inkindled, ſhould be drawn out and planted here and there in various places; in like manner, it may be judged of the Blood, which being quiet in Sleep, being called aſide or diſturbed with no Paſſions, nor with the impulſes of the Muſcles out of the *Præcordia*, or detained out of doors, enters the Lungs with a more full Flood, and there more ſlowly paſſes thorow the Centre or place of accenſion; whence, there is a Neceſſity, that it ſhould then be more plentifully inkindled, and burn with a greater flame, than if touch'd only with a more light burning, it ſhould haſtily paſs thorow thoſe places. But every one doth know

The Blood is more inkindled, and inflamed in Sleep, than in Waking.

Wherefore thoſe that Sleep, are apt to be Cold outwardly.

by Experience in himſelf, that in Sleeping, the Præcordia grow very hot, and the External Parts are apt to be cold; wherefore, there is need of covering them with Bed-Cloaths, whereby the Effluvia, deteined about the Compaſs of the Body, might warm it, whil'ſt in the mean time there is a Burning in the Breaſt, and from the Flame and Soot aſcending from thence, the Tongue and Parts about the Mouth, as if roaſted, are white: Hence in the Day-time thoſe Sleeping in the open Air, or any where elſe, unleſs well defended with Cloaths, take Cold: for by reaſon of the Heat being drawn back, the Cold little Bodies of the Air compaſſing them, enter into the Pores, and ſtop them up; but on the other ſide, *Aſthmatical* People, and ſuch as have their Lungs ſtuffed or bound together, or are otherways difficult to be moved, hardly Sleep within the Bed, becauſe the ambient Heat ſo greatly increaſes the Flame, inkindled in the Præcordia, that for the eventilating it, and conveying it thorow the Arteries, the Lungs being weak, and growing tyred in the Motion, are ſcarce, nay, not at all ſufficient.

2. Sleep allays the diſorders of the Blood.

2. For as much as the Blood is more inkindled during Sleep, therefore then chiefly its diſorders are allayed. But theſe are of a twofold Kind: to wit, either the Blood is variouſly agitated hither and thither by the impulſes of the Conteining and Neighbouring Bodies, as in violent Paſſions, and Commotions both of the Body and of the Soul: Or it grows turgid, or ſwells up by its proper rage, after the manner of fermenting Wine, from the Heterogene, and heating Particles being mixed with it. As to the Firſt, ſo long as we are Waking, the Courſe of the Blood being very much diſturbed, is continually agitated as it were with certain winds: becauſe the Fantaſie, more ſtrong Meditation, the Appetite, and the ſeveral Paſſions, drive the Blood ſometimes more ſwiftly, ſometimes repreſs it by their Influence, ſnatch it impetuouſly ſometimes into theſe, ſometimes into thoſe Parts, and thence again repel it. Beſides theſe Floods, ſtirred up by the Mind, alſo the Motions of the Body and Members, render its Courſe yet more troubled and dangerous; becauſe the Sanguiferous Veſſels, being variouſly preſſed, by the Motive Parts, and by and by releaſed; they variouſly transfer, and call back the Blood, and by and by ſnatch it elſewhere; hence, its Humour, ſo long as it rapidly runs from place to place, evaporates leſs, and ſo heaps together a greater ſtock of Excrementitious Matter, which being ſuppreſſed within, ſtirs up Preternatural Heat, and renders the Flame of the Blood unequal, more ſmoaky, and troubled, yea ſharp and biting, and ſo troubleſom to the Heart and Brain, and alſo to ſeveral Viſcera, and ſometimes to the whole Nervous Kind, all which notwithſtanding Sleep allays; yea whil'ſt the Animal Spirits lye quiet, like allayed winds, the Sea of the Blood preſently becomes Calm.

Whither they are induced by the conteining Bodies.

The Internal boyling up of the Blood, is alſo allayed by Sleep.

Nor is the Blood, diſturbed by reaſon of its proper Effervеſcency, leſs quieted by Sleep: for when it grows hot from ſuch a Cauſe, it flames not forth with a clear and bright Flame, but fumes up with Smoak and Soot, and therefore being leſs eventilated, diffuſeth a very troubleſom and ſharp heat: which alſo is more infeſtous, becauſe the Recrements of the Blood, to wit, the Serum, and aduſt, and otherways viſcous Particles, being involved with its ſmoaking Latex, cannot be ſeparated and carried away. But in Sleep, the Blood is ſoon quieted, and paſſes more ſlowly thorow the place of inkindling, to wit, the Lungs; wherefore being there firſt more inkindled, it burns with a clearer Flame, and alſo more mildly, and ſo the ſmoak preſently ceaſing, and ſome Heterogenious Particles being burnt, all the reſt extricating themſelves from Confuſion, what are profitable are imployed in their deſigned Offices, and what are unprofitable, are bolted or ſifted forth, partly by Breathing, Tranſpiration, or Sweat, and partly thorow the other Emunctories.

The Blood performs its Offices, (which are the generation of the Animal Spirits, and the nouriſhing of the Parts) better in Sleep.

3. The Blood burning forth more clearly and plentifully in Sleep, at that time alſo performs better, yea chiefly, or almoſt only its Offices, the chief of which are, the Stilling forth of the Animal Spirits, and the Nutrition of the ſolid Parts. And firſt, it Prepares beſt of all Matter for both theſe, to wit, it well ſubdues, dreſſes, and ripens the Chyme, infuſed into its Maſs: then it inſtills the more pure and more ſubtil Part into the Shell of the Brain, from which, the veterane Spirits, during Sleep depart, for the end that a way may be open, for the Nervous or Spirituous Liquor to reſtore their Stores; and in the mean time, the other part of the Chyme, is conveyed every way by the Arteries, to the ſolid Parts, and whil'ſt they are quiet, it is beſt of all put upon them, and ſuffered to grow to them; otherwiſe, by their too great Motion and Agitation (as in Waking) it is apt to be ſhaken and wiped off.

Sleep is not to be yielded to, preſently after Eating.

But that Nutrition, and the Production of Animal Spirits may be rightly performed, in Sleep, it is not to be preſently indulged after Eating; for ſo the aforeſaid Offices are wont, not only to be hindred, but perverted into Evil; becauſe if any one Sleep with his Belly full, the Chyle as yet Crude, is ſnatched into the Blood: then before it can be there broken ſmall, and mixed with the Blood exactly, it is expoſed to a more full inkindling within the Lungs; that from thence the Lungs themſelves not rarely draw,

as

as from Juyces and Vapours there ſent forth, from the Crude inkindled Matter (as it were from green Wood) an Evil: which thing indeed is obſerved of many, falling into the *Phthiſis* or Conſumption of the Lungs. Thirdly, At length from the *Chyme* ſo evilly prepared, neither pure Spirits are diſpenſed to the Brain, nor laudible nouriſhment to the ſolid Parts; yea, that is obſcured and made dull by Fumes and Vapours, and theſe are diſpoſed into a *Cachexie* or *Atrophie*.

Such Sleep hurts the Lungs and Brain. Makes the Spirits more dull, and gives evil nouriſhment.

So much concerning the Effects and Alterations of Sleep, which indeed are wont to be more immediately impreſſed on the Flamey part of the Soul, rooted in the Blood, but mediately on the Parts of the Body depending upon it: Now let us ſee next, what this Paſſion brings to the other Part of the Soul, *viz.* the Lucid; and its Subjects, to wit, the Brain and Nervous Stock; Concerning theſe, we will ſhew what Sleep contributes to the diſpenſation of the Nervous Liquor, and to the generation of Spirits out of it, we ſhall alſo further Conſider, what ſort of influence it has on their Exerciſes and Government.

What Sleep affords to the lucid part of the Soul.

As to theſe, Firſt, It is to be noted, which we before-mentioned, to wit, that the Spirits of the Regiment of the Brain, the Executors of every Spontaneous Function, are employed only Waking; and that others ariſing from the Cerebel, both Waking and in Sleep: There is need for Sleep only for the former, whil'ſt they are well, that their Expences or conſumed Stores might be by it repaired: yea, and that the languiſhing or wearineſs of thoſe remaining might be refreſhed. This every one experiences in himſelf, and feels that there is no farther need of explaining it: But if the ſame Spirits, by ſome Morbifick Cauſe, being provoked, are moved into diſorder, that they become irregular about the Acts of Motions, or of the Senſes, whether Interior or Exterior, and ſtir up a Delirium, Convulſions, or Pains; Sleep, like a Charm, fully quiets theſe Spirits, how mad and deviliſh ſoever they be: wherefore if it comes not of it ſelf, in theſe Caſes it ought to be fetch'd with Opiats.

It refreſhes the wearied Spirits inhabiting the Brain.

And allays them, being out of order.

But as to the Spirits, the inhabitants of the Cerebel, becauſe, in Waking they are diſturbed by the buſineſs and tumult of the Spontaneous Functions, and being called away from their Labours are hindred; therefore, they perform their tasks better in the reſt and deep ſilence of the others: Hence the Concoction and the diſtribution of the Food, and the Separation of the Excrements, yea, and the *Oeconomy* of the whole Animal Function, is beſt performed by reaſon of Sleep: Hence, if at any time, too much Meat, or more groſs than is wont, being eaten, moleſts the Stomach, and inducing fulneſs, nauſeouſneſs, or bitter and acid belching to it, approaching Sleep, for the moſt Parts takes away theſe Evils, and facilitating the Concoction of the *Chyle*, clears it from its ſharpneſs, foulneſs, and bitterneſs. The reaſon of which is, becauſe the Animal Spirits, which actuating the Fibres of the Stomach, ſerve for Digeſtion, whil'ſt awake; being forced to bear its manner or guiſe towards the Brain, and its Parts, are diſtracted here and there, and are called away from their proper work, ſo that the Meat being as it were unfermented, and undigeſted, ſtays in the Ventricle. This every one plainly experiences in himſelf, if preſently he ſits down after feeding to Study, or ſerious Reading, for then the Brain being full and diſturbed, the ponderous and heavy *Chyle* in the Stomach, is deprived of Digeſtion: But in Sleep, the Spirits inhabiting the Ventricle, being freed from the Buſineſſes of the Brain, do beſt of all perform their task, and rightly digeſt and exalt by Fermentation, the *Chyle* in the Stomach, like an Elixir in a Furnace, with an equal and convenient heat. I might here enumerate other benefits of Sleep, for as much as it refreſhes the whole Faculties of the Soul, renews the vigour of the Intellect or Wit, ſharpens the Senſes, ſtops the tumults of Paſſions, recollects the forces of the Cogitations, as often as they are either wholly enervated, or diſtracted by immoderate Study, or long Waking, allays and quiets all things, and heals the weak Brain, and the languiſhments of its Parts, yea, and of all other Parts and Powers, by giving to them new forces or ſtrength, as it were Food to ſuch as want.

The Spirits inhabiting the Cerebel, are diſturbed, in Waking, with the Spirits of the other Regiment.

Why thoſe being diſturbed, do perform their Offices better, whil'ſt theſe lye quiet in Sleep.

Other benefits of Sleep are noted.

Hence Chylification, and other functions merely Natural, are performed beſt of all in Sleep.

The Nature, Cauſes, and Effects of Sleep, being unfolded after this manner, before we wholly leave its Conſideration, it will not be from the Matter, to ſubjoyn ſomething of Dreams, we ſhall here purpoſely paſs over what manner of Signification they have, both Natural, as they indicate the intemperance of the Brain, and alſo fatidical, as if they were inſpired by a *Damon*, and are affirmed to Propheſie things to come: we ſhall only inquire by what Motion, and agitation of the Animal Spirits, Dreams are produced in the Brain. We ſay therefore, that the Animal Spirits, although they affect naturally alternate times of Motion and Reſt, and whil'ſt they indulge Reſt, inſtilling freſh Nervous Humor to the Brain, they ſuffer themſelves to be bound together with Embraces, as it were with Chains, that they may not enter into Motion; yet it for the moſt part happens, that ſome Spirits eaſily caſt off this Bond, and love to wander hither and thither, in the deep ſilence of the Reſt. And indeed Dreams are only the Excurſions of ſome

Of Dreams.

What they are.

ſome Spirits in the Brain, from their bond or tye, which, whil'ſt the reſt are ſtrictly bound together, wander about, without any Guide or Ruler; and repeat the types or ſhaddows of Motions, as it were Dances before learnt; and are wont to repreſent the Cogitations of things, though after a very confuſed manner. The Spirits which being got looſe, variouſly run about, whil'ſt the reſt are bound together, gain the Liberty of Motion, by a twofold means. To wit, ſome Spirits, fly from the Captivity of Sleep, for the moſt part, by reaſon of the Heat and Agitation of the Brain, as by Drinking of Wine, the fume of Tobacco, immoderate Exerciſe, as alſo by the Paſſions, and more hard ſtudy, is wont to ariſe: for by theſe means, the Spirits are ſtirred up, by a certain Stimulation or Provokement, and are driven as it were into rage, that, though Sleep creep upon them, all of them will not be bound or reſtrained, but that ſome of them will walk about the Sepulchers of the reſt, like Spectres in a Church-yard, and Cauſe ſtupendious Apparitions of things. Another Exſuſcitation of ſome Spirits in the Brain, whereby Dreams are produced, is made by reaſon of ſome Spirits being diſturbed in other Parts, as in the Præcordia, Stomach, Spleen, Genitals, *&c.* By which, whil'ſt the ſame Perturbation is Communicated by the Nerves to the Brain, perhaps one or two Handfuls or Bands of Spirits, there ſtirred up, cauſes various Phantaſies to be repreſented. In the Diſeaſe called the *Incubus* or Night-Mare, when the Præcordia are ſtop'd in their Motion, or otherwiſe hindred, by reaſon of the Nerves being bound together, we Dream ſome Animal or heavy weight lying upon the Breaſt, ſtops our Breathing. The Genital Humor growing turgid or ſwelling up in the Veſſels, and irritating them, produces immodeſt Dreams. Undigeſted and groſs Meats, eaten at Supper, becauſe they aggravate or lye heavy in the Ventricle, and trouble it, render Sleep alſo troubled, and infeſted with terrible and affrightful Phantaſies; in like manner we might eaſily ſhew, that it is the ſame with many other Parts.

They are ſometimes excited by the Spirits inhabiting the Brain.

Sometimes by Spirits inhabiting other Parts, to wit, the Stomach, Spleen, Genitals.

Whil'ſt as it were private Troops of Spirits, being excited in the Brain, carrying themſelves hither and thither, exerciſe the Phantaſie, their Divergency or Excurſions happen ſometimes regularly, ſometimes inordinately: and therefore Dreams, repreſent either the Series of things before acted, or only *Chimera*'s, or Notions altogether incongruous and diſagreeing. Further, whil'ſt the Animal Spirits, being agitated by this means, within the Brain, produce Dreams or the Images of Cogitations, do often leap back, into the Nervous Stock, and there ſtirring up other Spirits, produce divers ſorts of local Motions: wherefore ſome Men alſo, when they Sleep ſoundly, are wont to riſe out of their Bed, to walk here and there, to remove the Houſhold-ſtuff from place to place, oftentimes to put on their Cloaths, to open the Doors, go up Stairs, and to paſs over Rocky places, which they could ſcarce go over when Awake; in the mean time if they meet with any Obſtacle in their Progreſs, they either adviſedly paſs by it, or remove it out of the way. I knew a certain Man, who was wont after this manner to walk a-Nights like a Spectre, and to ſpeak to others whom he met being Awake, would take them by the hand, and often-times ſtrike them, then, unleſs he being roughly handled did Awake; returning to his Bed, and after Awaking of his own accord, knew nothing at all of what he had done. Yea, it is obſerved of moſt of theſe Night-walkers like Spirits, that being awakned, they ſcarce remember any thing of what they did, or acted in their Sleep; as if they ſuffer'd ſomething that was different from other Dreamers; for theſe think that they perform local Motions, when indeed there is no ſuch thing, but the others move from place to place, and yet know nothing of it. In Dreamers, the Spirits being ſtirred up, ſpread or are carried wholly inwards, towards the Callous Body, and affect only the Imagination and Memory: but in thoſe walking in their Sleep, ſome handfuls or bands of them, being awakned, direct their tendency only outwards, towards the moving Parts, in the mean time, the Common Senſe, Imagination, and Memory are not at all affected. It is wonderful, what ordinarily happens to Witches, or Wiſe-women; to wit, they, whil'ſt they lye Buried in a profound Sleep imagine that they are in very far and remote places, and that they have ſeen the Spectacles of Seas and Lands, and things wholly unknown to them, and ſhall exactly deſcribe them; which without doubt is, becauſe the Devil brings the Idea's of theſe things before the Phantaſie, and ſo ſtrongly impreſſes them, that they for a certain believe, that they had been in them: On the contrary, Walkers in their Sleep, wander about the whole Houſe, and its Precincts, and truly perform divers Actions, of which, when they are Awake, they are wholly ignorant. If the reaſon of this Kind of Paſſion be inquired into, this firſt of all occurs; that thoſe ſo affected, freely exerciſe, at that time, the Faculties, both Senſitive and Locomotive; becauſe, they not only move their Feet and Arms, as it were in certain Meaſures and Numbers, as a Machine furniſhed with wheels and force is wont to do; but moreover, they hear with their Ears, ſee with their Eyes, and with a certain diſcretion vary their local Motions, according to the Impreſſions made

Dreams ſometimes ſtir up local Motions.

made from ſenſible things. Wherefore, from hence we may lawfully conclude, that ſome Animal Spirits, being ſtirred up inordinately, within the hinder Part of the middle of the Brain, perhaps about the ſtreaked Bodies, do ſtrike upon the little heads of the Nerves, and ſo raiſe up other Spirits, implanted by a long Series, within the nervous Paſſages, and the moving Parts, and drive them into Motions before accuſtomed to; hence the divers movings of the Body and Members, are produced. But, becauſe the tendency of the Spirits excited is made only outwards, and is not at all reflected inwards into the ſtreaked and Callous Bodies; therefore, for that the Common Senſory nor the Imagination are affected, they neither perceive nor remember the Actions they had done. If it ſhould be demanded, (for as much as the Common Senſe at this time is ſtupified or aſleep) by what inſtinct the Animal Spirits are determined, according to the Impreſſions of Senſible Things, for the performing of local Motions of this or that Kind; It may be ſaid, That this reciprocation of Senſe and Motion, depends chiefly upon Cuſtom, *viz.* The Spirits being before accuſtomed to be ordered after this or that manner, and having gotten the Liberty of Action in Sleep, compoſe themſelves of their own accord, for the performing of their wonted Meaſures; even as when an Harper, whil'ſt he is thinking of ſome other thing, his Fingers being before taught the Numbers of the Tune, exactly ſtrike the Strings, with wonderful agility and diſcretion.

Therefore, the Cauſe of walking in Sleep, ſeems to conſiſt in this, *viz.* That the Animal Spirits are too fierce and unquiet, and will not all lye down together, but that ſome of them, more fierce than the reſt, leap forth of their own accord, and enter into Motion, like as perhaps one or two Dogs, ſtarting out without government, leave the company of the reſt and fall to Hunting: For that Cauſe alſo, the Spirits ſo apt to wander and roam about for Excurſion, obtain their more free ſpaces in the Oblong Marrow, nigh the Nervous Original, rather than in the Brain or in its middle or marrowie Part. For it ſeems, that during Sleep, the Pores and Paſſages in the globous frame of the Brain, are ſtuffed up ſo, that the Spirits there, like to water frozen, are thruſt in hard together; in the mean time, the Subſtance within the Medullar Proceſſes of the Brain, and the Oblong Marrow, which lead towards the Nervous Original, is more looſe, and poſſeſſed leſs with an adventitious Humour; that the Spirits there being ready for Motion, eaſily make way for themſelves to go forth, and entring the little heads of the Nerves, produce local Motions, of which the Common Senſe, and the Superior Faculties of the Soul are utterly ignorant. For ſuch a Diſpoſition of the Brain and its Appendix, which inclines to wandring by Night, as if it depended upon a certain peculiar Conformation of the Organ, is proper to ſome Men from their Birth; nor does it indifferently happen to all Men, or is ever contracted by the reaſon of inordinate Living. I have known in a certain Family, where both the Father, and all his Children were obnoxious to this Affection, the Brothers would often run up and down in the Night, in their Sleep, ſometimes meet and lay hold upon one another, and ſo awake one another. But others, who had not this Evil impreſs'd upon them from their Birth, have fallen into this Diſtemper, without any fore-warning or manifeſt Occaſion.

Thus much concerning Sleep, and by the by of Dreams: we have largely handled thus the Nature of it, becauſe this Speculation very much Conduces to the illuſtrating the Affections of the Brain, and the Nervous Stock. It behoves us next, that we conſider of the *Aurora* of Sleep, to wit, Waking; but this may be conſidered under a twofold reſpect; either Firſt, for as much as it ſucceeds Sleep, it is its bound; or Secondly, according to its proper Eſſence. As to the former, we Awake, or Sleep is ſhaken off, either becauſe it ends of its own accord, or becauſe it is interrupted. That it may end of its own accord, two things are requiſite, to wit, that the Animal Spirits, being enough refreſhed, riſe up of their own accord, and return to their wonted watches; which indeed, they for the moſt part do, at a ſet-time, unleſs hinder'd: Secondly, That what ever is ſuperfluous of the ſerous Humor, by whoſe Embraces the Spirits are bound, be evaporated: for after Banquetting, or often Drinking, by which a greater plenty of the ſerous and ſpirituous *Latex* is carried to the Brain, we Sleep longer; ſo that there is need that Sleep be longer protracted, that it may ſuffice to ſpew forth the untamed Wine. But Reſt is very much interrupted by a violent Senſation; to wit, ſome Spirits dwelling about the Extremities of the Nerves, being awakned by the impulſe of ſome ſtrong object, awake others in the Common Senſory, whereby Senſation is performed, and then the ſtroke being further continued, all, being, as it were at a Sign given, called to Arms, awake ſuddenly, and fall to their watches. This kind of troubleſom Senſation, which awakes the Animal Spirits from Sleep, is not only brought in from an outward ſenſible thing, as when a great ſound, or ſtroke made on the Fleſh, ſhakes off Sleep; but ſometimes the Nervous Parts are pulled by a ſharp Humor, Phyſick, Worms, and other Internal Diſtempers, and ſo a Convulſion or Pain ariſing, the Spirits are compelled into Motion, and for that reaſon,

Of Waking. A double Conſideration of it.

1. *As it follows upon Sleep. Waking is either Natural or Violent.*

ſon, we are excited from Sleep. As often as Sleep is broken off ſooner than it ought, often yawning, and reatching, for the moſt part follows: the reaſon of which is, becauſe the Spirits being awakned, ſtrive by contracting and extending thoſe Parts, to ſhake off the Dewie Humor, not ſufficiently evaporated from the Brain and Nervous Parts. Further, If we are forced to awake, before the Spirits are refreſhed with their wonted Proviſion, they from thence become dull and heavy, and leſs ready for the exerciſe of the Animal Function.

The Eſſence or formal Reaſon of Waking.

As to the Eſſence or formal Reaſon of Waking, it conſiſts in the liberty and expanſion of the Animal Spirits, in the Brain, and the whole Nervous Stock. For theſe, like ſtanding Souldiers, deſire to watch, both to meet the ſenſible Object, alſo by reaſon of their obedience towards the Superior Powers of the Soul, ſo long as they are fit for this work: But that the Animal Spirits may be able to perform their watches in a juſt time, and with their whole ſtrength it is required, that they ſhould be free without any Impediments; to wit, that they be not irritated with any groſs, or otherways Excrementitious Humor, nor drowned with a ſerous heap, but that being free from all burthen, they might remain ready, and ſtill nimble for the ſwifteſt Motions. Then Secondly, That the Spirits may rightly perform their watches, there is need, that they ſhould be only intangled in moderate Affairs. Being fitted by theſe Kind of defences, they lively accompliſh their Task, and daily for ſo many hours, continue their Motion, like the Wheels of a Clock, and then, the time being expired, they go to Reſt of their own accord.

The End of the Firſt Part.

THE SECOND PART PATHOLOGICAL:

OR

Of the DISEASES which belong to the Corporeal Soul and its Subjects, *viz.*

The Brain and the Nervous Stock.

CHAP. I.

Of the Headach.

The Pain of the Head the chiefest and most common affection among Diseases.

THE pain of the Head is wont to be accounted the chiefest of the Diseases of the Head, and as it were to lead the troops of the other Affections of that part; for that it is the most common and most frequent symptom, to which indeed there is none but is sometimes obnoxious, so that it is become a Proverb, as a sign of a more rare and admirable thing, *That his Head did never ake.*

The Causes of it manifold, and very diverse, that they can hardly be methodically recited.

Hence it is, that its Cure is often instituted Empirically.

The Headach, though it be a most frequent Distemper, hath so various, uncertain, and often a contrary original, that it seems most difficult to deliver an exact *Theorie* of its appearance, containing the solutions of so manifold, and often opposite things. This Disease being constant to no temperament, constitution, or manner of living, nor to no kind of evident or adjoyning causes; ordinarily falls upon cold and hot, sober and intemperate, the empty and the full bellied, the fat and the lean, the young and old, yea upon Men and Women of every age, state, or condition. Hence, because they cannot satisfie any one sick with this Distemper, with the causes of it, most commonly they say, they all proceed from Vapours. Further, the Cure of this Disease is more happily instituted, not so much by certain Indications, as by trying various things, and at length, by collecting an Extempory method of Healing, from things helping and hurting. Wherefore, if I should go about to untye this hard knot, by drawing forth the matter more deeply and more accurately, I must ask for pardon, if I am carried, by a long compass, thorow the various Series and Complication of Causes: and if at length, by any means, the *Ætiology* or the Reason of this Disease may be fully detected, a more certain way to its Cure may be opened.

What things belong to its Pathology.

Therefore, that we may go on more fully to institute this *Pathology*, or shewing the Causes or *Symptoms* of this Disease, we ought first of all to unfold the Subject, and the formal reason of this Disease, together with the Causes and differences; then to subjoyn the Curatory method, and to illustrate it with some more rare Cases and Observations.

The Subject of this Disease.

As to the former, as all pain is a hurt or violated Action, or a troublesome sension or feeling, depending on a Convulsion, or a Corrugation of the Nerves, the Subject of the Headach are the most nervous parts of the Head, that is, the Nerves themselves, as also the Fibres and Membranes, and such as are more and most sensible, seated both without and within the skull. But the parts of this kind, which are affected with pain, are first the two *Meninges*, and their various processes, the Coats of

the Nerves, the *Pericranium* (or skin compaſſing the skull) and other thin skinny Membranes, the fleſhy Panicle of the Muſcle, and laſtly the skin it ſelf. As to the Brain and Cerebel, and their Medullary dependences, we affirm, That theſe Bodies are free from pains, becauſe they want ſenſible Fibres, apt to be wrinkled and diſtended: the ſame, for the like reaſon, may be ſaid of the Skull.

The formal Reaſon of it.

2. But whenſoever pain is excited any where about the nervous parts of the Head, its formal reaſon conſiſts in this, That the Animal Spirits being drawn one from another, and put to flight, cauſe the containing Bodies to be pulled together and wrinkled, and ſo ſtir up a troubleſome ſenſion or feeling: But that which ſo diſtracts the Spirits, that from thence a troubleſome feeling ariſes, is ſome improportionate thing, ruſhing upon the Spirits themſelves, or on the Bodies containing them, which entring the Pores of, and ſpaces between, the Fibres, pulls them one from another, and ſo drives the ſpirits dwelling there into diſorder.

The differences and kinds.

Pain is either without, or within the Skull;

3. As to the differences of the Headach, the common diſtinction is, That the pain of the Head is either without the Skull, or within its cavity: The former is a more rare and a more gentle diſeaſe, becauſe the parts above the Skull are not ſo ſenſible as the interior *Meninges*; nor are they watered with ſo plentiful a flood of Blood, that by its ſudden and vehement incurſion, they may be eaſily diſtended, or inflamed above meaſure. Secondly, The other kind of Headach, to wit, within the Skull, is more frequent, and much more cruel, becauſe the Membranes, cloathing the Brain, are very ſenſible, and the Blood is poured upon them by a manifold paſſage, and by many and greater Arteries. Further, becauſe the Blood or its Serum, ſometimes paſſing thorow all the Arteries at once, both the *Carotides* and the *Vertebrals*, and ſometimes apart, thorow theſe or thoſe, on the one ſide or the oppoſite, bring hurt to the *Meninges*, hence the pain is cauſed that is interior; which is either univerſal, infeſting the whole Head or its greateſt part; or particular, which is limited to ſome private region; and ſometimes produces a Meagrim on the ſide, ſometimes in the forepart, and ſometimes in the hinder part of the Head.

Or univerſal, or particular.

This either before, behind, or on the ſide.

Many other differences of it noted;

There are many other differences of this Diſeaſe, to wit, That the Pain is either light or vehement, ſharp or dull, ſhort or of continuance, continual or intermitting; its approaches ſometimes periodical and exact, ſometimes wandring and uncertain. Alſo by reaſon of the Conjunct Cauſe, which (as ſhall be declared by and by) ſometimes is the Blood, ſometimes certain excrements of it, as either the Serum, or nouriſhing juice, or vapours, or wind; ſometimes it is the nervous liquor, ſometimes a congreſſion or ſtriving of it with the bloody liquor: The Headach may be called, either bloody, and that either ſimple, or elſe ſerous, vaporous, or otherways excrementitious; or elſe Convulſive, from the humor watering the nervous Fibres, and irritating them into painful Corrugations.

Of which the chiefeſt is, that it is either occaſional, or habitual.

Concerning theſe, that we may proceed methodically, we ſhall rehearſe in a certain order, the various kinds of this Diſeaſe, with their Cauſes; and it ſeems good, that we diſtinguiſh the Pain of the Head to be either accidental, or occaſional and habitual: The former is wont to be excited without any foregoing cauſe, or previous diſpoſition, by the ſolitary evident cauſe, as when an Headach happens almoſt to all men after the drinking of Wine, Surfetting, lying in the Sun, or vehement exercíſe, alſo in the fitts of Feavours; to wit, foraſmuch as the Blood being incited, more than it was wont, and boiling up immoderately, very much blows up and diſtends the Membranes it paſſes thorow; yea the Serum and Vapors, copiouſly ſent forth, from it, then growing hot, and ruſhing on the Membranes, pull and provoke the nervous Fibres.

The reaſon of the former unfolded.

The habitual Pain of the Head hath always a more remote Cauſe, beſides the evident Cauſe.

The evils, or the weak Conſtitution of the affected part, and the eaſie flowing in of the morbific matter, concur to this more remote cauſe.

Secondly, The habitual pain of the Head, hath ſome *procatartick* or more remote Cauſe fixed ſomewhere, by reaſon of which it is troubled, either conſtantly or often; ſo that though it ſometimes intermits, yet it often returns of its own accord, and is excited alſo upon every light occaſion: but this, whether it be continual or intermitting, hath neither always, nor only, the Suffuſions or too great Evaporations of the Blood or Serum, for the Conjunct Cauſe, (although theſe are often preſent, where notwithſtanding they are rather inſtead of the Evident Cauſe, than the Conjunct) but beſide, an evil *procatarxis*, or a certain prediſpoſition, is always affixed to the part affected, or wont to be diſtemper'd; by reaſon of which, the aforeſaid Cauſes, alſo the inordinations of the Nervous Liquor, and the meeting and growing hot of it with the bloody Serum, or the Nutritious Juice, raiſe up the fits of pains.

The Parts of the Head prediſpoſed, and their vices, viz. an evil or weak conformation are noted.

Although the more remote Cauſe of the Headach be manifold and diverſe, ſo that its ſeveral kinds can ſcarcely be number'd, yet for the conſtituting it, theſe two, to wit, either one or both of them, do chiefly or for the moſt part lead the way, *viz.* Firſt, The evil or weak Conſtitution of the affected part. Secondly, Then, becauſe of the more eaſie and ready heaping up of the Morbific matter in it.

As

As to the former, the parts of the Head obnoxious to pains, are the Nervous Fibres, belonging to the Membranes, Tendons, the Muſculous fleſh, and other ſenſible Bodies; the Morbid proviſion of which conſiſts in their evil conformation or debility.

Of theſe, that the former is ſometimes innate and hereditary, appears from hence, becauſe the Diſeaſe is often delivered from the Parents to the Children: and ſeems to be done chiefly by this means: becauſe the covering of the Head being made more thick, or more cloſe than it ought, neither the humors, nor the vapours do eaſily paſs thorow; wherefore being by theſe reſtrained, and hindred in their Motion, and ſo heaped up, the *Meninges*, *Pericranium*, and other ſenſible parts, being too much ſtuffed, or inflated, or hauled, receive pains: to which happens, that ſometimes, by reaſon of the original intemperance of the Brain, the Humors or Vapours about the parts, hanging like an arch over it, are variouſly heaped up together. *The former oftentimes is innate and hereditary;*

2. But it more often comes to paſs, that the Vices of an evil Conformation, by which theſe or thoſe parts of the Head are diſpoſed to the Headach, are contracted anew, and that by a various kind of production: for ſometimes by Cold taken, by reaſon of the Northern winds, Snow, or Rain, the Pores of the skin in ſome region of the Head, yea and the nervous Fibres themſelves, are ſo cloſed up, or otherwiſe perverted or weakned, that they are not able to bear the outward air, nor the agitations of the Blood or Humors, but preſently the Headach ariſes. *But more often is contracted anew:* *And chiefly from Cold,*

Nor is the prediſpoſition of the Headach leſs rarely produced, in the diſorderly uſeing the ſix not natural things. For the Blood being ſtirred up above meaſure, upon any cauſe whatſoever, impreſſes by its boyling up, or by the inſinuation of the Serum or Vapours, a breaking of the unity in ſome nervous parts, or ſome other ſort of hurt; for which reaſon, as there is a preſent Headach, by and by ſtirred up, ſo afterwards there is a diſpoſition to the ſame, upon every light occaſion. But oftentimes a diſpoſition to the Headach not eaſily blotted out, is induced by a vehement Paſſion, Surfeit, Drunkenneſs, alſo by a blow, wound, or contuſion of the Head: ſo that either the proper or excrementitious humors being heaped up, and ſtanding in thoſe parts, being afterwards moved of themſelves, or growing hot with other inflowing juices, ſtir up inflations, or painful haulings or pullings. Yea, I have known Inflammations, Impoſthumes, Whelks, *Scirrhous* tumors growing to the *Meninges* with the Skull, and other Diſeaſes of an evil conformation, excited in the Membranes of the Brain; by which, at firſt for a long time, frequent Headaches, and moſt cruel, and then afterwards a ſleepy and deadly diſtemper hath been induced; the cauſe of the Diſeaſe not detected, but after death by *Anatomy*; and indeed it is to be ſuſpected, that inveterate and pertinacious pains in the Head, which return, and dayly become more tormentive, in ſpight of all Remedies, depend upon ſome ſuch invincible cauſe. *Alſo by reaſon of the inordinations in the ſix non naturals.* *By accident.* *From internal Concretions.*

2. Not only an evil conformation, or the breach of unity, but alſo ſometimes a meer weakneſs or enervation, renders ſome parts of the Head obnoxious to the Headach; for when as the Fibres are ſomewhere ſo infirm, that they are neither able of themſelves to rule the proper humor, nor to reſiſt the incurſions of a ſtrange humor; the part ſo diſpoſed, by reaſon of any light occaſion, is moved into painful wrinklings: Theſe kind of debilities of the Fibres, ſometimes external accidents, as the exceſs of cold or heat; ſometimes alſo errors in Dyet or living, as Surfeit, Drunkenneſs, and eſpecially ſleeping at noon; moreover great *Catarrhs*, and a long lodging of a ſharp Serum are wont to bring in. *2. The debility of the diſtemper'd part is alſo a more remote cauſe of the Headach;* *Which outward accidents and errours in feeding and other Diſtempers, are wont to produce.*

So much for the primary more remote cauſe of the Headach, which is alſo fixed and rooted: The other cauſe of it, ſecondary and moveable, conſiſts in a ready and eaſie heaping up of the Morbific matter about the prediſpoſed parts, from which come the fits of pains, and their approaches: But as the matter is manifold, it is wont to be heaped up after a diverſe manner, and to excite pains which affect after a diverſe ſort: This, as we have ſaid, is either the Blood, or its Serum, or the nouriſhing Juice, or the nervous Liquor. Every of theſe being variouſly diſpoſed, or imbued with feculences or dregs, are by degrees heaped up about the prediſpoſed parts of the Head, ſometimes before the fit; and ſometimes, that coming, they are plentifully caſt down. But ſometimes one only humour with its plenitude and acrimony, diſtends or provokes the ſenſible Fibres; ſometimes more meeting together, by their mutual growing hot, pull or haule the Fibres, and ſo ſtir up painful Convulſions. We ſhall briefly take notice of the ſeveral kinds of theſe, with their ſigns, and the manner of their being made. When therefore a part of the Head, as chiefly the *Meninges*, or ſome region of the *Pericranium*, is prediſpoſed, by reaſon of an evil conformation or debility, to the Headach; the approaches or fits of the Diſeaſe are wont to be excited, by rea- *The other part of the more remote Cauſe, ſecondary and moveable, conſiſting in the flowing in of the morbific matter.* *This matter is either the Blood, or its ſerum, or the nutritious, or nervous Juice.* *Which ſometimes alone, ſometimes meeting together, irritate the prediſpoſed parts.*

ſon of the various incurſions or coming together of the following humors, ſometimes of this, ſometimes of that humor, and ſometimes of many together.

How the Blood excites the Headach.

1. Sometimes the Blood it ſelf being incited into a more rapid motion, and boiling up into the Head, is ſtraitned or ſtopp'd in its paſſage about the prediſpoſed places, and from thence, being by and by heaped up there, diſtends the Veſſels, greatly blows up the Membranes, and pulls the nervous Fibres one from another, and ſo brings to them painful corrugations or wrinklings. For this reaſon thoſe obnoxious to the Headach, are forced to ſhun all occaſions by which the Blood ſhould grow hot above meaſure, as drinking of Wine, Exerciſe, Baths, *&c.*

2 How the Serum.

2. The Serum being more copiouſly heaped up in the bloody Maſs, oftentimes conceives a ſudden Flux, either of its own accord through meer fulneſs, or ſtirred up by an evident cauſe, and ſo preſently running forth from the Blood doth not only ruſh into the Lungs, but very often into the Head, and being poured upon its Membranes or Muſcles, is copiouſly heaped up about the parts prediſpoſed to the Headach, and there induces painful Corrugations and Inflations. Further, the Serum carries with it infeſtous Recrements, as ſulphureous, ſaline, ſharp, acid, bilous, or melancholic, or of ſome other kind, and fixes them to the nervous Fibres, which cauſe an acute or dull, a ſhorter or a longer pain. The Headaches ariſing by reaſon of this kind of remote cauſe, infeſt more grievouſly in the Winter time, in a moiſt Air, and in a Southern Wind: Moreover, *Catarrhs* of the Face, Mouth, *Larynx*, and of other parts, oftentimes accompany this Diſeaſe.

3 How the nutritious Juice.

3. The nouriſhing Juice, or freſh *Chyme*, being carried from the Blood to the ſolid parts, and laid upon them, by reaſon it becomes improportionate to ſome parts of the Head evilly diſpoſed, is wont to excite periodical fits of the Headach. For this proviſion being laid up near ſome nervous Fibres, becauſe it cannot be aſſimilated, begins to trouble them or burthen them, after ſome ſtay, and at length provokes them into wrinklings to expulſe that which troubles them. An Headach proceeding from ſuch a cauſe, as I have obſerved in many, doth dayly come at ſo many hours after eating, and continues a like ſpace of time; yea the times alter according to the manner of taking their repaſt, both as to the quality and quantity, and ſo alſo the fits of the pains are wont to vary.

4 How the nervous Liquor is a cauſe of this Diſeaſe.

4. The nervous Liquor, is a cauſe of pains, by its inordination, as oftentimes in other parts, ſo alſo not ſeldom in the Head; for this either degenerating from its temper, or being imbued with dregs or filthineſs, does not paſs thorow ſo freely the nervous Fibers, but is apt to ſtagnate, and to be heaped up in them to an irritative fulneſs: and that chiefly within the Fibres made weak beforehand, or of an evil conformation (ſuch as are ſometimes the Membranes of the Head) becauſe in theſe prediſpoſed, the watering Liquor being hindred in Motion, eaſily ariſes to an aggravating or provoking fulneſs; ſo that the Fibres being ſo filled, like the ſtomach too much crammed, enter into Convulſions and painful wrinklings, for the putting away their contents, nor do they ceaſe from them, till they are freed of their burthen; which notwithſtanding, afterwards being heaped up again, ſometimes ſooner and ſometimes later, cauſe from thence others, and ſo again other fits of pains. The Headach ariſing from ſuch a cauſe, ſprings oftentimes without any notable turgeſcency of the Blood, and gently and as it were of its own accord, without any errors in dyet or living; yet ſometimes it may ſooner ariſe by reaſon of diſorders in the non-naturals, and other accidents: This is wont to come more often in the Morning, and after long ſleeping, when the nervous Fibres have drunk in this humor more largely.

The Headach ariſing from the fault of the nervous Liquor infeſts chiefly in the Morning.

5 How many humors meeting together, and mutually growing hot, ſtir up Headaches.

In the aforeſaid Headaches, the Morbifick matter is made up for the moſt part of one ſingular humor, and ſo the fits of the pains are ſomething more gentle, and oftentimes ſooner paſs over. But there is another Cauſe of this Diſeaſe, when two humors (like divers kinds of Salts) meet together, and grow mutually hot, and ſo from the ſtrife of diſſimilar particles, the Fibres are very much pulled, and moved into very acute and cutting pains, and are moſt commonly longer infeſted with them. In this caſe one of the champions is always the nervous liquor, but the other, either the ſerous water or the nouriſhing juice. We exempt the Blood, becauſe it only waſhes the paſſages of the Nerves, and does not enter them deeply; but the nervous humor, by reaſon of the vices but now recited, ſometimes of it ſelf, pulls the containing Fibres, and provokes them into painful Convulſions. If that another humor, either the Nutritious or Serous, (for both of them are wont to be guilty) being little of kin, be plentifully poured upon this ſo prediſpoſed, and copiouſly heaped up within the Fibres; preſently all the particles being raiſed up, ſtrive among themſelves, and ſo by a mutual effervency, notably diſtend and haule the Fibres, that from hence from their being long and greatly wrinkled, moſt ſharp and long remaining pains are induced. Whether it be

this

this or that humor, meeting with the nervous juice, that cauſes the Headach, may be eaſily known from the proper irregularities, above deſcribed, of either peccant humor by it ſelf.

The habitual Headach depends chiefly upon the fault of the nervous humor.

By what means, and for what more remote cauſes, the humors, either Nutritious or Serous, offend, as often as meeting with the Nervous humour, contained within the Fibres, move the fits of pains, ſhall be declared anon: in the mean time, I think it ſufficiently appears, that the more frequent and habitual Headaches are produced chiefly by the fault of the nervous liquor, becauſe this is moſt intimate both with the Fibres themſelves, which are wrinkled, and the Spirits which are moved into painful diſtractions; alſo becauſe the pains of the Head ſometimes ariſe without any diſorder or tumult of the Blood, Serum, or nouriſhing Juice, and theſe being emptied or allayed, after what manner ſoever, oftentimes the Headach moſt pertinaciouſly continues.

The fault of the nervous liquor is either univerſal, or particular, proper to the place diſtempered.

But concerning the nervous Liquor, when it is the cauſe of the Headach, we obſerve that its fault is ſometimes univerſal, and ſometimes private: for ſometimes it doth acquire its evil from the diſtempered part: to wit, foraſmuch as being conſtrained to ſubſiſt or ſtagnate within the Fibres, hurt by their conformation, it is ſo perverted that at length being infeſted, fermenting either by it ſelf, or with ſome other humor, it irritates them into painful Corrugations: Yet ſometimes, and eſpecially in the more grievous Headaches, we may ſuppoſe that the whole Maſs of the nervous Liquor is in fault, but the nervous parts of the Head partake of its evil, before any others in the whole Body; becauſe theſe are the chief and neareſt ſprings of the nervous Liquor, and are alſo highly ſenſible: wherefore, the nervous Liquor, when ever it is vicious, either ſwelling up of its own accord, or growing hot by another humour being poured unto it, within the *Meninges* and other Membranes of the Head, more than in the other parts of the Body, becomes painful. The thing appears to be ſo, becauſe a long and grievous Headach is wont to be Cured, not ſo much by Remedies applyed or proper for the Head, as by thoſe which reſtore the *Craſis* or Conſtitution of the nervous Juice, and the bloody Maſs; and ſuch are *Chalybeats*, or Steel Medicines, and *Antiſcorbuticks*, or Medicines againſt the Scurvy. Which certainly argues that the nervous Liquor, where-ever it is in fault thorow the whole Body, chiefly puniſhes the parts of the Head.

The more remote or evident Cauſes of the Headach are noted.

Thus much for the cauſes of the Headach, both the procatartick or foregoing, and the Conjunct: there yet remain others more remote, called Evident, which raiſe up the former, and provoke them into act, or the painful means of affecting. But they are of a various kind, and of a divers operation: to wit, Whatever things are apt,

Of which ſort are, firſt, thoſe which move the morbific matter flowing from another place, to wit, either the Blood, or Serum, or nouriſhing juice, and ſtir it up within the places affected of the Head.

firſt, to transfer the Morbific matter from another place into the part affected; or ſecondly, to move it before lodging in it; or thirdly, and laſtly, which impreſs on the Fibres themſelves, prediſpoſed to painful Convulſions, this Diſtemper, by the conſent of the other parts afar off, they belong to this rank.

The Blood and its contents, in Headaches are ſometimes the means of the Conjunct, ſometimes of the Evident Cauſe.

As to the former, the Blood and its inmate humors, to wit, the Serous and nutritious; alſo the bilous, acid, and otherwiſe vicious recrements, are apt to be moved from various Cauſes, and to be transferred into the Membranes of the Head, *viz.* many accidents from without ordinarily effect this, as great and ſudden mutations of the Air, or the ſeaſon of the year, exceſs of heat or cold, or of moiſture, plentiful feeding, drinking of Wine, Bathing, immoderate Venus, violent paſſions; yea many other occaſions ſufficiently known, and to be avoided by all ſubject to Headaches. Further, theſe humors ſometimes ſwell up of their own accord, and without any external Cauſe, or other ways evident, being moved, drive themſelves forward into the Head: in which place, when they come, and ſettle upon the Fibres before indiſpoſed, though they conſtitute a part of the Conjunct Cauſe, yet they, when they are firſt in motion or flux, become the means of the Evident Cauſe. Wherefore, when we have firſt unfolded, by what means the Blood, with its contents, being carried to the diſtempered Membranes, ſtir up Headaches; we ſhall then ſhew by what means, and upon what occaſions, the ſame humors are wont to be moved, and to be ſnatched into the Membranes.

For what Cauſes the Blood is wont to be moved, and to bring hurt to the diſtempered Head.

And firſt the Blood growing hot of its own accord, and by reaſon of the ſtrife, and inteſtine motions of its particles, imparts its trouble to the Head: Its frequent and wandring turgency or boiling up, happens not only in the fits of Feavours, but alſo without any cauſe or ſuſpicion of diſeaſe, which in others ſcarce perceiveable, thoſe obnoxious to the Headach ſufficiently take notice of and feel; neither doth the blood only beſtow the hurt to the Head, from its own proper proviſion, but receiving it elſewhere, ſends it thither. Oftentimes the Blood receives the incongruous matter from the Stomach, Spleen, Meſentery, Liver, and other parts, or Inwards, infeſtous to it ſelf or nervous Stock; which growing hot a little time after,

that

The Blood delivers to the head the morbific matter received from any other part.

that it might extrude or thruſt it forth; it pours it upon the Membranes of the Head, and ſo produces the Headach, commonly called Sympathetick, *viz.* by a conſent excited in other parts; which kind of Diſtemper being tranſinitted from other parts to the Head, ſometimes alſo it happens after another manner, as ſhall be by and by declared.

A Flux of the Serum ſometimes from meer fullneſs.

When the Maſs of Blood abounds with Serum, it is ſometimes excited to the putting it off by meer fulneſs, wherefore it conceives a flux, or as it were a certain melting, to wit, by which the thin and watery part may be ſeparated from the thick and bloody. Then, becauſe the Blood becomes more diluted in its ſwelling up, and paſſes more ſwiftly and more copiouſly thorow the Arteries, than can be carried back by the Veins, almoſt all that is ſerous is ſent away by the ſpaces between the Veſſels, being poured ſometimes on theſe parts, and ſometimes on thoſe, as falling down in many places, it cauſes tumors or Catharrs, ſo lying on the Membranes of the Head, it ſtirs up fits of pains.

Sometimes from other Cauſes.

But the ſerous heap, from many other cauſes ſweating forth from the Blood ſuffering a flux, ruſhes on the Meninges and the Pericranium, and cauſes in them moſt troubleſome Headaches. A ſudden Conſtipation or cloſing of the Pores by Cold or Wet, almoſt conſtantly produces ſuch a Diſtemper in moſt, obnoxious to this Diſeaſe. Sharp and thin Wines, Cyder, yea and Beer, that by reaſon of its ſoureneſs is apt to ferment, becauſe they fuſe the Blood, and precipitate its ſeroſities, are forbid to thoſe troubled with Headaches, as ſo much poyſon: And laſtly, whatever is wont to cauſe a Flux in thoſe troubled with the Gout, the ſame alſo for the like reaſon cauſes it in theſe, for the riſing Serum, in either, flows to the diſtemper'd part, where it oftentimes grows hot with the nervous humor.

Sometimes the watry humor ſuffering a flux offends the Head.

Further, not only the meer and ſimple Serum of the Blood, dropping forth upon the Membranes of the Head, ſtirs up pains, but ſometimes other humors joyning together, and by this paſſage being admitted to the diſtemper'd part, encreaſe the tragedy of the Diſeaſe; it often happens, that a thin and watery humor doth ſuddenly flow forth from the Lymphic Veſſels, the Glandula's, and perhaps from the Paſſages and Pores of the ſolid parts (in which it is gathered together) and is poured forth into the Blood in the Veins; from whence preſently paſſing thorow the boſom of the Heart, and being confuſed with the Arterious Blood, and by that ſoon ſeparated, is caſt back by any way it can find; therefore, being partly ſent away by the Reins, it cauſes a flowing down of a clear and copious Urine, alſo ſometimes partly redounding on the Brain or Nervous Originals, produces Sleepy or Convulſive Diſtempers, as we have elſewhere ſhown. Yea ſometimes, a certain part of the ſame limpid humor, being ſnatched with the Serum into the Membranes of the Head, raiſes up fits of a moſt cruel Headach: For indeed, I have obſerved in many, a watry and very plentiful Urine, either to precede or accompany the fits of this Diſeaſe.

Hence in thoſe that have the Headach, as in Convulſive Diſeaſes, there is often a clear and copious Urine.

The recrements of other parts, often carried violently to the head with the Serum.

But we may believe other manner of recrements, of the other parts, *viz.* bile from the Liver, black bilary feculencies from the Spleen, and perhaps incongruous humors from the Stomach, Reins, Pancrace, *&c.* are ſupped up by the Serum of the Blood, and deeply boiled with it, by which, whilſt it is infected, it more readily conceives Effervеſcencies, and ſo ruſhing impetuouſly into the Cephalick Veſſels, and there fermenting with the nervous Liquor, brings forth Convulſions, and painful and very troubleſome pullings or haulings.

The evacuation of the Serum thorow its right ways, being ſuppreſſed, brings its flux to the Head.

The ſerous heap, whether it be ſimple, or as we have ſhown, complicated, is ſufficiently infeſtous to the Head, whenever its uſual evacuation, thorow its due and accuſtomed ways, is hindred: *viz.* whether if the Pores being bound up, tranſpiration be inhibited, or by reaſon of the evil diſtemper of the Reins, an Evacuation by Urine is not copiouſly performed; either defect greatly puniſhes thoſe ſubject to Headaches. Further, the Membranes of the Head are oppreſſed, by reaſon of the paſſages of the Blood being obſtructed in other places: for if the lower or middle parts of the Belly, and eſpecially the Liver and Lungs, are troubled with an obſtruction, ſo that the Blood can ſcarce paſs thorow in thoſe places, its more full torrent is directed into other parts, and eſpecially towards the Head; ſo that for this Cauſe, I have known to have followed, not only Headaches, but alſo ſoporiferors or ſleepy, and ſometimes deadly diſtempers.

3. The nutritious juice ſometimes the cauſe of the Headach, either,

1. Becauſe it is carried with the Blood into the Head.

3. As the Serum in the boſom of the Blood, ſo the nouriſhing Juice, that is the freſh *Chyme* made out of the Aliments, lodges there too, and is circulated with it, and forced to follow its inexorbitances, being as it were in the current of the ſame River. Wherefore, when the Blood, preſently after eating, is carried impetuouſly or inordinately to the Head, and the nouriſhing Juice being half Concocted or depraved, is fixed there to the Membranaceous Fibres, it cauſes painful pullings or haulings to follow; for

for hence it is, that exercise, bathing, violent passions, reading, or any serious intention of the Mind, upon a full stomach, hurt those troubled with Headaches.

Sometimes the nutritious Juice is not presently or easily mixed with the Blood, but being carried fresh to it, by and by stirs up a turgency, so that many, constantly after eating, are troubled with an high Colour, and oftentimes also with an Headach. This commonly, but amiss, is imputed to the obstruction of the Liver, when indeed it proceeds from an evil disposition of the Blood, hardly bearing the mixture of the fresh Chyme. Wherefore, such a distemper, follows for the most part dangerous Feavours, and especially the Small Pox, and sometimes great Surfeits.

2. Because not being agreeable to the blood, it stirs up its effervescency.

4. There yet remains another sort of Evident Causes, (to wit, by which the leading Causes, or predispositions to the Headach are actuated) plainly different from the former irregularities of the Blood, Serum, and nourishing juice; to wit, when Headaches very often most terrible, follow, by reason of Convulsions, begun in other parts, and from them continued to the Head. 'Tis an usual thing for a certain sense, or feeling, of a Formication, or little pricking, to creep forward from the *Hypochondria*, as also from the region of the Stomach, Mesentery, Womb, yea sometimes from the Members or outward parts, to the Head, and by and by sometime after to excite a pain that will last for a good while. This kind of Distemper, which is wont oftentimes to be the forerunner of the *Vertigo*, also of the *Epilepsie*, or the *Apoplexie*, is commonly believed to be the ascent of Vapours; when indeed it is only a Convulsion, begun in the extremity of some Nerve, which creeping upward towards its original, and then coming to the Skull, for as much as it either is communicated to the parts within the Head, or to the *Meninges*, either one or both of them, it stirs up Convulsions or pains. Which passions notwithstanding, follow this Formication or tingling, brought from elsewhere, sometimes as a sign, and sometimes as the cause. We have in another place largely enough unfolded the reason of the former, to wit, it being shown, that when the Morbifick matter possesses the beginnings of the Nerves, or the neerest parts to them in the Head, a Convulsion oftentimes beginning from the ends of the same Nerves, being carried thence upwards towards the places first distemper'd, ascends as it were by a creeping forward: wherefore not only upon the Vertigo, but upon the Headach, a Vomiting comes very frequently.

Sometimes the evident causes of the Headach are Convulsions somewhere begun and continued by the passage of the nerves, into the Head.

Convulsions beginning afar off, are sometimes signs of an Headach shortly to follow.

But further, an Irritation in some distant Member or Viscera, is sometimes the occasion, and in a sort the cause of the Headach; to wit, when the Morbifick matter is heaped up, even to a fulness of Turgency in the part of the Head already disaffected, there is need only of a light Vellication or pulling of the Containing Fibres, that this matter being stirred, should cause a fit of the Disease; to which movement, it often suffices, that by an intimate concent of some distant Inward, as the Ventricle, Spleen, or Womb, with the Head, the nervous Fibres should be pulled or hauled; for presently from thence, the trouble being communicated by the Nerves, some Membranaceous Fibres of the Head, being evilly disposed, and burthened with the Morbific Matter, begin to be strained and wrinkled, and so when the Mine of the Disease is moved from its moved Particles, the Fibres are urged into grievous and continual Corrugations.

Sometimes also the cause of it.

Headaches that seem to begin after this manner from the Viscera, and commonly called Sympathetic, are wont to be ascribed to Vapors, *viz.* by supposing a Mine of the noxious humor to lye hid in some Inward, from which being moved, whilst the Effluvia ascend into the Head, and there sharply pierce thorow and pull the nervous Fibres, pains are excited. We have already so plainly refuted this doctrine, that there is no need here to bring any other reasons to oppose it. But in the mean time, let us inquire whether pains of the Head do not arise also by other means, besides a Convulsive communication thorow the Nerves, by reason of the Morbific Cause lodging in the Stomach, Spleen, and other places.

Convulsive Headaches seem to arise so from the Viscera, not from Vapours.

Concerning this, we may suppose, that Matter oftentimes degenerate, is heaped up in remote parts, which carries its hurt to the Head, by the passage or Circulation of the Blood. 'Tis a usual thing for Corrupt humors, *viz.* sometimes sharp, sometimes acid or austere, to be heaped up in the Ventricle; Bile in the Liver, atrabilary or melancholic dregs about the Spleen, yea and other sort of degenerate Matter about the Mesentery, Womb, or other parts: from which being heaped up to a fulness of swelling up, a Fermentative *Miasm* or Infection is fixed to the Blood; from which, that, being as it were imbued with rage, impetuously grows hot, and partly by its swelling up, and partly by transferring what is incongruous into the Membranes of the Head, stirs up fierce and cruel fits of pains.

But this sympathetick Distemper perhaps proceeds elsewhere, by reason of an evil ferment, communicated to the blood.

As to the Ventricle, that it is so, some obnoxious to this Disease have plain experience. Because some of them, after the Bile or Choler flowing in the Stomach, and

So sometimes it seems to be caused from the Ventricle.

and others after a noted ſoureneſs, and ravenous hunger, moſt certainly expect a fit of the Headach. The reaſon of which ſeems partly to be, that thoſe contents of the Ventricle being ſupped up by the Blood, make it hot, and ſtir up in the ſame a Cephalic Turgency or ſwelling up; moreover, from this kind of ſharp Vitriolick, or otherways infeſtous matter, being heaped up and moved within the Stomach, a Convulſion, or Corrugation very troubleſome, is impreſſed on the Fibres and the extremities of the Nerves there inſerted, which immediately being continued into the Head, by the paſſages of the ſame Nerves of the eighth pair, and of the Intercoſtal, is communicated to the Membranes, and the nervous Fibres, prediſpoſed to painful wrinklings.

The Head and the Stomach intimately conſpire, and mutually affect one another.

By reaſon of the ſame Reciprocal Communication, between the Stomach and the Head, a nauſeouſneſs and Vomiting, as we ſaid but now, follows upon the Headach, *viz.* the Membranes being ſtirred up into painful wrinklings, by the Morbifick matter (even as is wont by a blow or wound) and transferring the evil by the paſſage of the Nerves to the Ventricle, guiltleſs of it ſelf, a vain endeavour of Vomiting ſometimes ariſes, nothing remaining within the Ventricle, that ſhould be caſt forth: yet ſometimes, from a cruel ſhaking of the Inwards, in ſtriving to Vomit, the Galliſh or Pancreatick humor, either one or both of them, being thruſt forth into the *Duodenum*, and caſt forth by Vomit, is ignorantly taken for the Cephalick matter.

2. How the Head-ach ſeems to ariſe from the Spleen.

2. The pains of the Head are wont to be imputed no leſs to the Spleen, than the Ventricle; and indeed 'tis ordinarily obſerved in Hypochondriacks, obnoxious alſo to this Diſeaſe, when a Pain, Inflation, a Rumbling, or ſome other Perturbation of the diſtemper'd Spleen, happens in the left-ſide, that the Headach, as if raiſed up by it, by and by frequently ſucceeds; hence, preſently 'tis the voice of the people, that theſe Vapours being ſent forth from the diſturbed Spleen, ſtir up the pain of the Head: But indeed, we may grant that the Headach ariſes ſometimes from the default of the Spleen, yet reject this opinion, that it ought for this cauſe to be imputed to Vapors, but indeed either to an evil Ferment, tranſmitted into the Blood from the Spleen, or from a Convulſion, from thence communicated to the Head, by the Nerves: becauſe in the Spleen evilly affected, the Melancholic humor being degenerate, ſometimes into a Vitriolic Nature, ſometimes a biting, ſometimes a ſharp, or otherways infeſtous, is oftentimes heaped up, which of its own accord being ſhaken forth, by reaſon of plenitude, or occaſionally by reaſon of ſome perturbation, and being confuſed with the Blood, impreſſes a Fermentation upon it, by which its Liquor ruſhing by it ſelf on the Membranes of the Head, or growing hot with the nervous Liquor, cauſes painful pullings or haulings. Further, it is no leſs probable, that ſometimes a Convulſion being excited in the nervous Fibres, which are very much diſpoſed about the Spleen, brought thence by the paſſages of the Nerves of the wandring and Intercoſtal pair, and continued to the Head, impreſſes the like Diſtemper to the Membranes prediſpoſed to it.

The like reaſon is for this Diſeaſe, ariſing from the Liver, Meſentery, or Womb.

3. A reaſon may be alſo rendred, according to the ſame *Pathology*, to wit, either from an evil Tranſmiſſion of the Ferment, or a continuation of the Convulſion, for Headaches which are ſaid to be raiſed up by conſent, from the Liver, Meſentery, the Womb, and other parts.

The kinds of habitual Headach are noted. It is either, Continual,

The habitual Headach, the *Ætiology*, or the Reaſon of which, we have already ſufficiently handled, is yet divided into certain kinds, to wit, it is either Continual, or Intermitting; but the periods of this are ſometimes determined to a certain time, and are ſometimes wandring and uncertain: we ſhall ſpeak briefly of each of theſe.

1. Sometimes therefore it happens, that ſome are afflicted with a Continual pain of the Head, to wit, for many days or months, little intermitting, unleſs when ſleep helps; in which caſe we ſuppoſe, that there is not only preſent a Procatartick or leading cauſe, but alſo a Conjunct, ſomewhere fixed and conſtant. For beſides that the parts affected, or that are wont to be affected, are weak, and their watering liquor much depraved, is apt to ſtagnate, or to grow hot with other humors; there is moreover oftentimes excited in them, a breaking of the unity, to wit, an Inflammation, a red and painful ſwelling, a Scirrhous tumor, or Impoſthum, or of ſome ſuch kind; about which, whilſt the humors of divers kinds do meet together, and are heaped up, there ariſe almoſt perpetual pains, by reaſon of the nervous Fibres being continually pulled or hauled. Theſe kinds of Headaches, do not rarely end in ſleepy diſtempers, and at length deadly; for when I have opened the Heads of many dead of theſe Diſeaſes, the ſigns or footſteps, declaring the aforeſaid kinds of Morbific cauſes, have appeared; ſome examples of theſe ſhall be added hereafter.

or Intermitting.

2. The habitual Headach, is for the moſt part Intermitting, whoſe fits, as they are certain and Periodical, or coming at a ſet period of time, are wont often to return in the ſpace of half a day and night, or once in twelve hours. Some more rare caſes I have known, which exactly repeating the Fits, came every other day, yea once in a week

week, or a month. It is an uſual thing, for Headaches, that ſeem to be driven away, to return again about the Equinoxes or Solſtices; to wit, becauſe at theſe times, the Blood and Humors conceive greater Turgences or riſings up, than are wont, and therefore are more apt to grow hot with the watering Liquor of the nervous parts of the Head, and to renew the wonted fits of pains. But when about theſe times of the year, Headaches return, they are not prorogued by a longer acceſſion for a great while, but for the moſt part, having gotten ſubordinate periods, they are wont to infeſt at ſome certain ſtanding hours, for the ſpace of twelve hours.

The Fits of the intermitting, either periodical, or certain;

When therefore a Periodical Headach hath its daily fits, for the moſt part the reaſon of theſe, as of Intermitting Feavors, ought to be ſought from the fault of the Morbifick Matter, ariſing to a plenitude at a ſet time, and then growing hot. For it may be ſuppoſed, that the proper Liquor is perverted ſomewhere about the Membranes of the Head, and the nervous Fibres evilly diſpoſed, or doth not well paſs thorow them; wherefore, when the nouriſhing Juice, placed alſo on the ſame parts from the Blood, is not preſently aſſimilated, nor doth well agree with the other humor; at length, from both of them heaped up together and diſagreeing, a mutual growing hot ariſes, and from thence a painful pulling of the Fibres: but for that the fits of the pains, are not always at the ſame diſtance after Eating, but ariſe in ſome ſooner, and in others later, and ſometimes before ſleep, and ſometimes after; the cauſe is, that partly the offices of Concoction, and diſtribution of the Aliments, are performed ſometimes ſooner, ſometimes later; and partly, becauſe in theſe the nervous Liquor, and in thoſe the nutritious Juice, is moſt in fault: wherefore, as the fulneſs of this happens ſooner, and of that later, ſo the times of the fit vary: we ſhall illuſtrate theſe afterwards, with obſervations made concerning the caſes of ſick perſons.

or incertain, and wandring.

3. When the fits of the intermitting Headach are wandring and uncertain, the *Procatarxis*, or foregoing cauſe of the Diſeaſe, is neither great nor conſtant, nor is the Evident Cauſe continual: Wherefore, when that either cauſe is oftentimes abſent, and one of them often wanting, the fits of the Diſeaſe are not tyed to certain times, but in ſome, they are as it were by chance and accidental, in others, in whom a prediſpoſition to this Diſtemper is a little more firmly rooted: the pains of the Head more frequently moleſt, and are ordinarily excited, by reaſon of various occaſions, yea and for ſome, they are wont to be moſt certainly expected. The reaſons of the fits ſo variouſly happening appear clearly above, from the *Ætiology* delivered of this Diſeaſe; beſides, the whole buſineſs ſhall be illuſtrated anon, by examples.

CHAP. II.

The Prognoſtick and Cure of the Headach.

The prognoſtick of the Headach, ſhews it eaſie or difficult to be cured; alſo,

the event of the Diſeaſe ſafe or dangerous..

So much for the Cauſes of the Headach, which being ſo various and diverſe, and their Series ſo perplex'd and intricate, it will not ſeem eaſie to keep one Method concerning all caſes of the Sick, whereby we may be led preſently to the true knowledge and Cure of this Diſeaſe; nor is there leſs difficulty concerning its Prognoſtick: But common experience affords ſome obſervations, from which it may be gathered, that the Cure of this Sickneſs is ſometimes eaſie, ſometimes difficult, or ſcarce poſſible; ſo that from thence it may be lawful to declare the event of the Diſeaſe, either ſafe, or very dangerous, or wholely uncertain.

By what ſigns we may pronounce it ſafe, and eaſie to be cured.

Truly, if any one enjoying formerly a perfect Health, ſhould fall into ſomething a cruel Headach, and of ſome long ſtanding, by reaſon of a more ſtrong Evident Cauſe, as drinking of Wine, Surfeit, Venus, immoderate Exerciſe, or ſuch like; forasmuch as the fore leading Morbid Cauſe is not as yet firmly laid, we may pronounce ſuch a Diſtemper to be ſafe enough, and not pertinacious

By what difficult.

But if the Morbific diſpoſition ſhould be inveterate, ſo that for many years the fits repeat often of their own accord, and upon every light occaſion, this, though not dangerouſly ſick, yet we predict it not eaſie to be Cured. Further, the Cure will be yet more difficult, if Hypochondriack or Hyſterical Diſtempers, oftentimes troubleſome, are oft wont to excite the Headach at every turn, or if the taint of an inveterate Venereal Diſeaſe be rooted in any diſtemper'd part.

By what ſcarce poſſible.

If that the pain of the Head ſhall be not only inveterate, but almoſt continual, that we might ſuſpect it to ariſe from an Inflammation, or a Scirrhous Tumour, an hot Swel-

ling, an Impoſthum, or Worms, there is none or very little hope of Cure; eſpecially becauſe the ſick will refuſe great remedies, as Salivation, or opening the Skull; which if they be made uſe of perhaps at any time with any fruit or ſucceſs, yet the former and this two for the moſt part are wont to be tedious to the ſick, before they can effect any thing worth the trouble and expectation.

By what, dangerous.

The pain of the Head either Continual or Periodical, if it be great, and hath joyned with it a Vertigo, Vomitting, or other Convulſive or Soporiferous Diſtempers, ſhews a ſuſpicion of great danger: even which often paſſes into a deadly *Apoplexie*, and not ſeldom into an *Epilepſie*, Palſie, Blindneſs, Deafneſs, and other funeſtous and incurable Diſeaſes.

The Curatory method of the Headach comprehends many Indications, and thoſe of a various kind, according to the manifold Species, Cauſes, and differences of this Diſeaſe, which will not be an eaſie thing here to ſet down, and rehearſe in order.

Accidental Headach eaſily cured.

The accidental Pain of the Head, with the remote Evident Cauſe, and its conſequences, ceaſes for the moſt part of its own accord, or at leaſt is taken away by letting of Blood, Reſt, and Sweat.

The habitual affords more indications.

The habitual Pain, by reaſon of the diverſity of Cauſes, *viz.* both the *Procatartick* and alſo the Conjunct, ſuggeſts alſo different intentions of Healing; we ſhall here briefly touch upon the chief of theſe, and to which all the reſt may be placed.

Two chief ſcopes of Cure.

In every habitual Headach, whether Continual or Intermitting, there are two chief ſcopes or intentions of Cure to be met with; to which all the other Curatory intentions ought to be aimed, and by which we ſhould provide againſt either Cauſe of the Morbid *Procatarxis*.

1. To cut in two the Bed or Root of the Diſtaſe.

1. To wit, in the firſt place, that all the Tinder or inkindling of the Diſeaſe be cut off, you muſt endeavour, that both the matter flowing to the diſtempered places of the Head, or thoſe evilly diſpoſed, or apt from thence to flow to them, be ſuppreſt, or called from thence to another place; then moreover, that Convulſions in other places excited, and that are wont to be propagated from thence into the Head, be prevented.

2. To root out the Conjunct Cauſe.

2. Then ſecondly, it muſt be indeavoured (if it may be done) that the Diſeaſe it ſelf, or its Conjunct Cauſe may be rooted out, that the places of the Head prediſpoſed to Headaches, (whether they be only enfeebled or hurt in their Conformation) whilſt they are defended from the frequent Excurſions of the infeſtous matter, may recover their former ſtate and vigour. Which kind of Indication, though it be very ſeldom ſuddenly or wholely performed, yet ſometimes the Cure is by degrees laboured out, by diligence and care, however fixed and rooted the Morbid matter be.

The Neſt or Tinder of the Diſtaſe, the blood, ſerum, nouriſhing juice, nervous Liquor, and the Recrements carried thorow the Blood.

As to what appertains to the firſt ſcope of healing, which is firſt and eſpecially to be regarded; we ſaid, that the Matter or Humours, which are wont to be gathered together about the parts of the Head prediſpoſed to the Headach, and to excite the fits of the Diſeaſe, are either the Blood or the Serum, or the nouriſhing or nervous Juice, or Liquor. Moreover, with every one of theſe Vapours and Effluvia's, as alſo Recrements, ſometimes Bilous, ſometimes Melancholic, ſometimes Acid, Salt, Sulphureous, and of ſome others of a various kind, taken into the Blood, from the Viſcera, ſometimes from thoſe, and ſometimes from theſe, we have ſhewed to be transferred by its paſſages into the Head: againſt the force and incurſion of all theſe, Medicinal fortifications are to be inſtituted.

How the inordinations of the Blood may be taken away and prevented.

1. And in the firſt place, if the leading cauſe to pains, or a diſpoſition thereto, lye about the Membranes of the Head, for that the Blood being hot, and apt to riſe up, ruſhes by heaps into the Membranes of the Head, and when it cannot eaſily paſs thorow them, diſtending the Veſſels above meaſure, and pulling the nervous Fibres, excites the fits of this Diſeaſe (whoſe ſigns are a Sanguine temperament, heat, and a fluſhing or redneſs about the head and face, alſo an high pulſe, and ſhaking, with veins diſtended with Blood) preſently it muſt be endeavoured, both that the Blood be made more ſedate, that it may not be ſo readily moved into rage or ſwelling up; as alſo that it be not incited, and boiling up may not be carried with a greater tendency or inclination into the Head, than into other parts, nor in like manner be compelled to ſtagnate, by reaſon of the boſomes of the *Meninges* being too full. Wherefore, if the fit infeſts long, let blood in the Arm, or the Jugular Vein: out of the fit, ſometimes it is expedient to take Blood from the Sedal Veins, with Leeches; to wit, by this means, that the Blood by chance boiling up, may be brought down towards that place, to which it often tends of its own accord. Let there be Medicines of Vinegar, Roſecakes, and Nutmeg, or ſome other *Epithems* or Medicines of the ſame nature applyed to the Head: Alſo give to drink *Juleps*, *Emulſions*, or *Decoctions*, which allay the fervour or madneſs of the Blood. Let the Belly be cooled and kept ſoluble by the uſe of Clyſters.

Clysters. Moreover, for prevention, use at times Whey, or Spaw-waters; also drinking of Water, a thin and a cooling diet help; the shunning of Wine, spiced Meats, Baths, Venus, violent motions of the mind or body, yea and of all hot things is to be ordered. Then for the fixing of the Blood, its Effervescencies or growing hot must be prevented, for which, Distilled Waters, Juices of Herbs, or Decoctions, Electuaries, Powders, and especially *Crystal Mineral*, are in frequent use. There is no need here to add a method or particular forms of Medicines, when in this case, almost every body labouring, is wont to be his own Physician, being taught by frequent experience, from things hurting or helping.

The pain of the Head from the serous heap, how to be cured.

2. It is rarely, that the Blood alone or only by it self is in the fault; more often other humors, being carried by its passage to the Head, and there disposed, cause the hurt: Therefore, when ever the Serous Colluvies, or heap, goes out from the Blood (as was shown but now) it causes Headaches frequently, (the signs of which are *Catarrhs* about other parts, *viz.* the Nose, Mouth, or Throat, being infested with them) then abstinency and rest is to be ordered, and that the belly be emptied by a Clyster, for the allaying the flux of the Serum, and that the matter be suffered to evaporate from the Membranes of the Head; if these do not succeed, and that the Headach ceases not quickly, and of its own accord, oftentimes in a more hot Constitution, Phlebotomy is convenient; to wit, because the Vessels being emptied of Blood, sup up the extravasated Serum: But in frigid tempers, Vesicatories or Blisters are of notable use, applied to the hinder-part of the Head, or nigh the Ears. Then after the Belly is emptied by a Clyster, the Flux may be allayed, by the use of *Anodynes*, or more gentle opiats: that being allayed it may be convenient to exhibit a gentle Purge, then Medicines, which either move by Urine or Sweat, or by both together, that so they may gently evacuate the superfluous Serosities.

Phlebotomy.

Purges.

Medicines fit for this purpose may be every where found in Books: which notwithstanding are not to be made use of by *Empericks* rashly, and without distinction; but ought to be designed according to the judgment and skill of a prudent Physician, always having a respect to the Constitution, the temperament, and proper disposition of the Patient, and to other accidents and circumstances, and to be compounded or altered according as the matter requires; yea sometimes to be prescribed extempore. Wherefore, since it will be altogether needless, here to heap up many Receipts, and a great pile of Medicines, it shall be sufficient to propose in this place, one or two forms only, of every sort of Medicines, respecting the chief intentions.

Pills.

Take *Pills of Amber half a dram, Resine of Jalap four grains, of Peruvian Balsam what will suffice to make four Pills, let three be taken when the Patient goes to sleep, and the other in the morning, if they work not enough.*

Purging Powders.

Or Take *of sulphurated Scammony half a scruple, of the Ceruse of Antimony fifteen grains, of the Cream of Tartar eight grains; make a Powder, to be taken in a spoonful of Grewel, early in the morning.*

An emetick Powder.

Take *of the Sulphur of Antimony four grains, of the Resine of Jalap five grains, of the Cream of Tartar six grains, bruise them together, and with what will suffice of the Conserve of Violets, make a Bolus, to be taken early in the morning with care, or by government.*

An Apozem.

Take *of the Roots of Butchers-Broom, Burdocks, Cherefoil, Avens, each one ounce; of preserv'd Eryngo an ounce and an half, of the Florentine Iris three drams, of the lesser Galangal a dram and an half, of the Seeds of Burdock three drams, of the dryed leaves of Betony, Sage, Vervine, female Betony, each half an handful; of Raisins of the Sun stoned two ounces; boil these in four pints of fair water, till a third part be consumed, then add to it of white Wine half a pound, strain it, and sweeten it (if need be) with syrup of the Five Roots two ounces; take of this six ounces warm, twice or thrice in a day, a good while after meals.*

A decoction of Woods.

For such as are indued with a more Cold and Phlegmatick Constitution, the like Decoction of the Wood of Guaicum, Sasafras, Sarsaparilla, with the addition of the aforesaid Ingredients, make an Apozem, of which take six or eight Ounces, twice or thrice in a day warm.

A Cephalick Decoction impregnated with the Tincture of Coffee.

For the poor, and oftentimes with good success for the rich, I was wont to prescribe a Decoction of the dry'd leaves sometimes of Sage or Betony, Vervine, or Rosemary, made of Spring-water, and impregnated with the tincture of the Powder of the Berries of Coffee, taken warm twice a day, about six or eight Ounces.

The Headach from other humours mixt with the serum, how to be cured.

3. If that with the running out Serum, Saline, Acid, Bilous, or otherways Infestous particles, received either wholely from the Mass of Blood, or by its means from

the Viſcera, are carried into the Membranes of the Head, and being there fixed, bring forth great, acute, and continual pains, then it will be convenient to iterate ſparingly, the taking away of Blood, yea and ſometime a gentle Purge, to apply cooling Medicines, *Anodynes*, and ſweetners to the diſtemper'd places; ſo oftentimes alſo to exhibite more gentle *Hypnoticks*, or Medicines cauſing ſleep, at every turn; alſo *Apózems*, and the Juices of Herbs preſſed forth, which allay the fervour of Choler, carry it forth gently by Stool or Urine, and are of known uſe: but in the mean time more ſharp Medicines, or the more ſtrong, whether they be purgative, working by Sweat or Urine, helping it, for that they too much fuſe and ſhake the Blood and Humors, are carefully to be ſhunned. I have frequently obſerved in thoſe labouring with an acute and pertinacious pain in the Head, the Serum ſwimming in the Blood being let forth, to be dyed with a yellowneſs, or Bilous Recrements being boiled in it; alſo in this caſe, let Phlebotomy be ſparingly but often celebrated, and the drinking Whey, or Spaw-waters plentifully, have helped before any thing elſe.

The Headach ariſing from any Inward, how to be cured.

4. Further, by the fault of any Inward, as the Stomach, Liver, Spleen, or Womb, or of any other (by reaſon of the tranſmiſſion of an evil Ferment) the parts of the Head ſuffer, then in the Cure of the Diſeaſe, Remedies for the Spleen are to be given, with *Cephalicks*, or ſuch as are proper to the Head: Hence the Stomach being alſo in the fault, theſe often times are helpful to ſuch as are troubled with Headaches, *Elixir Proprietatis*, the *Elixir* of *Vitriol* of *Mynſich*, the ſacred Tincture, *Vitriol* of Steel, the Powder of *Aron* Compound, and others ordinarily had for the Stomach; for others whoſe heads partake of the evils of the Spleen, *Chalybeats*, or Medicines made of Steel often yield help. Some Women troubled with Headaches have felt eaſe from *Hyſterical* Remedies. In like manner, when the vices of other parts contribute to the Headach, let there be joyned with the former ſhown you, things to be taken for thoſe parts.

Rais'd up from the fault of the nouriſhing Juice, how to be handled.

5. Sometimes the nouriſhing Juice (as we ſhowed already) is the cauſe of the periodical Headach, *viz.* foraſmuch as this being poured on the Blood, and not rightly aſſimilated, by reaſon of diſagreeing particles, cauſes a ſwelling up in it, ſo that the Blood boiling up into the Head, carries its leavings or ſuperfluities into the *Meninges*, or into ſome of their prediſpoſed parts, and by this means ſtir up the Fibres into painful Convulſions. I have known many for this cauſe, to have been obnoxious to dayly Headaches, whoſe Maſs of Blood hath been vitiated after the Small Pox, Meaſels, and other Feavours, and ſickneſſes: *viz.* ſo many hours after eating, ſometimes ſooner and ſometimes later, firſt a fluſhing of redneſs in the Face, then a fullneſs in the Head, and a pain would infeſt them, and eſpecially after drinking of Wine, or eating of Meats apt to ſwell up, they would be more vexed. The coming of the Diſeaſe is wont to keep its diſtance, according as Meats are taken more or leſs, as the *Chyme* begins to ſwell up, either a little after its firſt entring into the Blood, or after a little ſtay in it.

Frequently follows the Small Pox and Meaſles.

Eaſily cured.

This Diſtemper is free from danger, and for the moſt part is eaſily enough Cured. After a proviſion of the whole, a gentle Purge, and ſometimes Blood-letting being ordered, Remedies profit moſt which reſtore the Complexion of the Blood, ſuch chiefly are *Antiſcorbuticks* and *Chalybeates*.

An Electuary.

Take *of the Conſerve of Fumitory, of Tanſie, and Wood-Sorrel, each two ounces; of the Powder of Aron Compound three drams, of Ivory, Crabs-Eyes, Coral prepared, each one dram; Powder of yellow Saunders, and Lignum Aloes, each half a dram; of the Vitriol of Steel one dram, of the Salt of Wormwood a dram and a half, of the Syrup of the Five Roots what will ſuffice to make an Electuary. Take of it in the morning, and at five a clock in the afternoon the quantity of a Cheſnut, drinking after it three ounces of the following liquor.*

A Julep.

Take *of the water of the leaves of Aron, of Vervine, of Elderflowers, each ſix ounces; of the Water of Snails, and the Magiſterial of Earth-worms, each two ounces; of Sugar one ounce: Mingle them.*

Antiſcorbutick Remedies good for it.

Hither may be brought various Remedies, that are wont to be made uſe of againſt the Scorbutick Dyſcraſie, or evil diſpoſition of the Blood, and may be given with good ſucceſs: For Headaches, which are ſo familiar in the Scurvy, oftentimes proceed from the vice of the Blood perverting the nutritious Humor, and carrying its Recrements to the Membranes of the Head: Wherefore Remedies againſt that Diſtemper, in another place noted by me, may be uſed here.

The Headach raiſed up from the vice of the

6. There yet remains another humor, to wit, the nervous Liquor, which being heaped up within the Fibres of the Meninges, and of other parts of the Head, ſometimes

times becomes improportionate, by its proper incongruity, to the Fibres, becauſe ſharp or otherways degenerate, ſometimes pulls the containing parts, and provokes them into painful Convulſions, or Diſtentions, becauſe it grows hot with ſome other Humor flowing thither, to wit, the Nutritious or the Serous. *nervous humour, how to be cured.*

The Nervous Humor, when it is ſo Morbific or faulty in its whole Maſs, carries its evil to the prediſpoſed Head, or if of it ſelf innocent, is perverted within the diſtemper'd Fibres, and ſo ſecondarily becomes Morbific or Diſeaſed; then the Cure of it depends upon the reſtitution of the containing parts; to wit, if the Debilities, or the hurt Conformation of the Fibres may be mended, preſently the Humor watering them will be free from fault. We ſhall tell you by and by, by what Remedies the vices of the parts prediſpoſed to Headaches may be taken away. *Its fault either private or particular,*

In the mean time, if the nervous humor, being degenerate in the whole Maſs, imparts its evil to the Head prepared for pain, thoſe kind of Medicines, and method are to be made uſe of, by which it being reduced to its due Conſtitution, paſſing thorow thoſe Fibres, it little or nothing provokes them. For which end, neither letting of Blood, nor yet ſtrong Purges are at all convenient, becauſe thoſe things which ſhake the Blood and Humors, and leſſen ſtrength, impreſs by that means a greater ſharpneſs and rage to the faulty Nerve. But gentle Solutives, and a ſparing taking of Blood, ſometimes may be uſeful, whereby the Inwards may be cleanſed, and the bloody Maſs ſomewhat purged, and a way made for other Medicines, that may better ſucceed. *Or univerſal; and then letting of blood, or ſtronger Purges, are not convenient.*

But Medicines, which render the nervous Liquor more friendly and benigne to the Membranes of the Head, that are wont to be troubled by it, are of that ſort commonly called *Cephalicks*, whoſe particles being active, thin, and ſubtil, paſs thorow the Blood without trouble or tumult; then inſinuating themſelves with the nervous Liquor, gently move it, and ſo cauſe the nervous paſſages to be unfolded, ſo that the Animal Spirits, more freely beam forth thorow all the Bodies, both ſenſible and motive, and inſpire them without any leſſening, Convulſions, or irregular diſtentions. *Remedies called Cephalicks proper here.* *Of which ſort are theſe,*

Theſe kind of Remedies, although they are not always effectual, yet they oftentimes take away ſome Headaches not much inveterate, and in ſome, help ſometimes how pertinacious ſoever they be. Further, the ſame which are preſcribed with good ſucceſs for the pains of the Head, are alſo for the diſtempers of the Brain and Nervous Stock; and ſo on the contrary, what are uſed for theſe, alſo for thoſe; to wit, the virtues of thoſe being unfolded within the Head, againſt the Apoplexy, Palſie, Lethargy, and other Diſeaſes a-kin to them, help alſo within the moving Fibres, againſt Convulſions and Convulſive Motions; beſides, putting forth their virtues within the ſenſible Fibres, they often give help to pains. *which are convenient in Diſeaſes of the Brain, and in theſe kind of Headaches.*

A very large field of theſe Medicines are opened in phyſical Books, yet ſo, that the poorneſs of them, and their abundance, bring confuſion to the Method of healing; for oftentimes among ſo many various and different Remedies, heaped up together, lye hid or obſcured, what may be of great uſe, but even as Wheat among Chaff, harder to be ſeparated than that to be thorowly ſifted out from the husks. *A great many of theſe every where to be found in Phyſical Books.*

Therefore in this caſe, a proviſion of the whole being made, and applyed, and things given which by Dyet or Medicine, reſtrain the Inordinations of the Blood, and immediately allay them; Medicines called Cephalicks, or ſuch as take away the diſorders of the nervous Juice, are preſcribed to be carefully taken. I ſhall add ſome few forms of theſe.

Take *of the Conſerve of the Flowers of Betony, of Clove-gilliflowers, each three ounces; of the Powder of the Root of the male Pœony half an ounce, of Cretick Dittanny one dram; of the wood Aloes, and yellow Sanders, each one dram; of red Coral prepared, of Pearl, of Ivory, each one dram and a half; of the Salt of Vervine one dram and a half, of the Syrup of the Flowers of Pœony, what will ſuffice: make an Opiat, take of it to the quantity of a Cheſnut, drinking after it of the following Julep three ounces.* *An Electuary.*

Take *of ſimple black Cherry water, and of Walnuts, and of Vervine, each four ounces; of Cowſlip Flowers three ounces, of Pœony Compound two ounces, of Sugar-Candy ſix drams.* *Julep.*

Take *of the Flowers of Vervine, Miſleto Berries, each ten handfuls; of the male Pœony Roots two pound, of Mace and Nutmegs, each half an ounce; of Coriander Seeds one ounce; cut and bruiſe them and put to them eight pints of new-milk (or elſe ſeven pints of Milk and one pint of Malago) Diſtil them in a common Still, and mix all the liquor together: Take of it three ounces at a time.* *A diſtilled water.*

Take

Tablets. Take *of the Powder of the Root of the male Pœony half an ounce, of red Coral prepared two drams, of Ivory and Pearls prepared, each one dram; make of them all a very fine Powder, add to it of Sugar what will ſuffice; boil them to the conſiſtence of Tablets with ſix ounces of black Cherry-water, of the Tincture of Coral one dram; make of them Tablets according to Art, to the weight of half a dram: Eat three or four in the Morning, and at five of the Clock in the Afternoon, drinking after them a draught of Tea.*

Tinctures. Or Take *of the Tincture of Coral one ounce; take of it from fifteen to twenty drops twice in a day, in a little draught of Julep, or of the diſtilled water.*

Spirits. They who are of a Phlegmatick or more Cold temper may take a Doſe twice a day, either of the Tincture of Antimony, or of the Spirits of Armoniac, impregnated with Amber or Coral, or of Spirits of Harts-horn, or of Sut, in a proper Vehicle.

The uſe of millepedes notably helps. We ought not to omit, or poſtpone the uſe of Millepedes or Woodlice, for that the Juice of them, wrung forth, with the diſtilled Water, alſo a Powder of them prepared, oftentimes bring notable help, for the Curing of old and pertinacious Headaches. I might here propoſe divers other kinds of Medicines; yea all thoſe which I have formerly heaped up, againſt Convulſive Diſtempers, may be brought hither. But yet the moſt difficult knot of the Cure of the Headach, remains to be untied, to wit, how the conjunct Cauſe of this Diſeaſe, and fixed, conſiſting in the weakneſs, or hurt Conformation of the Fibres, may be healed or taken away

The other part of the conjunct Cauſe, conſiſting in the weakneſs or evil conformation of the diſtempered part, how to be handled.

We are not to deſpair of the Cure. Although this is ſometimes incurable, to wit, when as a *Scirrhous*, or *Callous* Tumor, or ſome other old and fixed ſwelling, has poſſeſt the *Meninges*; yet, for that the knowledge of this is uncertain, and that the leading Cauſe, how cruel ſoever it ſeems, is ſometimes overcome by a long courſe of Phyſick; therefore in every Headach, ſo long as the Patient will admit of Remedies, let it not ſeem troubleſome to the Phyſician, to preſcribe thoſe things which ſeem moſt convenient.

Here thoſe Medicines are only profitable, that cut off the inkindling or root of the Diſeaſe. Therefore, firſt of all, which we hinted before, you muſt carefully endeavour that the neſt, or feeding of the Diſeaſe be cut off or intercepted, and that the frequent coming of the fits be hindred; for ſo the indiſpoſed Fibres, ſo long as they are no more affected only by the means of Nature, will recover health.

Chyrurgical Remedies chiefly help here; of which are, In this caſe the helps of the Medical Art, are rather to be ſought from the Chirurgical part, than from Phyſick: for whatſoever is taken at the mouth, going about by long turnings and windings, ſpends all the vertue before it comes to the Membranes of the Head.

1. Plaſters. Among Chirurgical Remedies, firſt Topicks are met with, and among theſe, Plaſters are of moſt profitable uſe, and oftentimes give the greateſt benefit: Let not theſe be very hot, which may rather draw the humors to the diſtemper'd place, but moderately diſcuſſing and ſtrengthening. I was wont to preſcribe Plaſters of Red-Lead, and of Sope, with double of the proportion of the Plaſter of *Paracelſus*, to be applied to the part, it being firſt ſhaven, and to be let remain there for ſome time The Antients frequently adminiſtred Plaſters made of Muſtard, and ſuch as raiſed wheals or whelks over the parts, and it is a daily practice to apply ſometimes to all the hinder part of the Head, and ſometimes to the former, Veſicatories or bliſtering Plaſters, againſt moſt cruel Headaches: when eaſe is got from theſe more hot *Topicks*, it is becauſe by theſe adminiſtrations, plenty of the more ſharp Serum is drawn away from the diſaffected part.

Medicines raiſing Whelks and Bliſters.

Liniments, Fomentations and Bathings, help not. Liniments of Oyls and Oyntments, though often made uſe of, effect little; becauſe (as I think) if they ſhould penetrate deeply into the tones of the Fibres, they would looſen them more; ſo that they would more eaſily lye open to the Incurſions of the Morbifick matter: Further, they ſtop up the Pores of the skin, whereby the Effluvia's do leſs evaporate. Almoſt for the ſame reaſon, as hot ſtupes or Fomentations made of boiled Spices, or other Cephalicks, oftner hurt than profit; foraſmuch as they draw the humors towards the diſtemper'd parts, and alſo open the Pores and paſſages, whereby they are more readily admitted; it is that a Bathing of the Head, or an Embrocation or waſhing of the Head, at the pumps in hot Baths, is uſed with no better ſucceſs for Headaches: When on the contrary, it hath been beneficial to many, to pour cold water every Morning and Evening on the temples, forehead, and forepart of the Head: yea to waſh or pump the whole Head, every Morning with cold water, or at leaſt to dip it into a Bucket or Pit of water.

An Embrocation, or a dipping of the head in cold water, oftentimes helps.

Iſſues. Another Chirurgical help, eſpecially for an inveterate and cruel Headach, and much cry'd up, is wont to be the burning or cutting of Iſſues, in ſeveral parts of the Body. It is without doubt, that theſe being made in the Arms or Legs, are both leſs troubleſome, and do bring ſomething of help: becauſe they draw away the feeding of the Diſeaſe

Diſeaſe in part, and call it away far from the diſtemper'd part. Beſides, Iſſues in the nape of the Neck, and a Seaton in the hinder part of the Neck, behind the Ear, or near it; alſo a piece of the root of wild Hellebore, being put into an hole made in the Ear, becauſe they evacuate much ſeroſity, and draw it to other Emunctuaries, to wit, the Glandulas, are oftentimes adminiſtred with benefit. But indeed, there hath been a talk, and much expectation from Cauteries, made on the grieved place, or near it, and ſo large Iſſues have been made on the top of the Head, or nigh to the joyning of the Sutures. If we ſhould meaſure this practice by the fruit or ſucceſs, it will appear to be rarely beneficial, but more often unlucky. For I never knew any healed, but many troubled with Headaches, to be much the worſe for it. And truly, reaſon plainly tells us, that where a Fontinel is made, thither the Serous Humor flows, from the whole bloody Maſs, and by conſequence from the whole body, and oftentimes is there heaped up more copiouſly than can conſtantly be put forth by that Emiſſary: wherefore, there ordinarily ariſe about Iſſues, a red ſwelling, puſtles, and various humors. Why ſhould I not then believe, that a Cautery made nigh to the grieved part of the Head, ſhould rather cauſe the Morbific matter to be there heaped up?

Iſſues made upon or near the diſtempered place, help little.

There is yet another Chirurgical operation cry'd up by many for a pertinacious Headach, but by none (that I know of) yet attempted, to wit, an opening of the Skull, near the grieved place, with a *Trypaning* Iron. This our moſt ingenious *Harvey* endeavoured to perſuade a Noble Lady, labouring with a moſt grievous and inveterate Headach, promiſing a Cure from thence; but neither ſhe, nor any other would admit that adminiſtration. Indeed, it did not appear to me, that there could be any thing of certainty expected from the opening of the Skull where it was pained; if an Impoſthum lay hid there, this had been the only way of Cure; but that would rather have cauſed ſleepy diſtempers, or deadly Convulſions than the Headach. If that a red ſwelling, or puſtles, or a burning boil, ſhould be in the enfoldings of the Head, I know not if thoſe Tumors, expoſed to the open Air, would more eaſily evaporate, or whether Remedies applyed to thoſe naked places, would effect any thing or not; becauſe, if the pains ariſe by reaſon of the *Meninges* being beſet with little whelks, a Scirrhous or a Callous Tumor, I think the opening of the Skull will profit little or nothing.

The opening of the Skull cry'd up by many, but rarely or never attempted.

But letting this alone till it is practiſed, we ſhall paſs over to other things; and now in the next place, we ſhall conſider, whether Salivation for the Curing old and confirmed Headaches is to be adminiſtred. Indeed, if the pains of the Head ariſe from the Venereal Diſeaſe, no doubt but that evil Remedy ought to be applyed to that evil Diſtemper: But having tryed that kind of remedy in Headaches ariſing from other Cauſes, I found not the harveſt worth the pains, and I confeſs ſome examples in thoſe kind of caſes, have terrified me from that method. A certain noble Lady (whoſe ſickneſs is below deſcribed) for the Curing of a cruel and continual Headach, underwent a plentiful Salivation three times, *viz.* the firſt by a Mercurial Oyntment, by the counſel of Sir *Theodore Mayern*, and afterwards twice by taking the lately famous Powder of *Charles Huis*, without any help, I wiſh not with ſome detriment: for afterwards for many years, even to this day, the diſeaſe being by degrees increaſed, ſhe ſuffer'd under its heavy tyranny. It happened ſomewhat worſe, ſo that noted man Doctor *G. D.* to whom a Mercurial Oyntment was applied for his akeing Head, for the Cure of an old Headach, by which a Salivation being excited, and the Diſeaſe not Cured, he fell into blindneſs. Indeed theſe kind of effects from Quickſilver, raſhly given, every one, rightly weighing its operation on an humane body, ought to fear. For the Mercury, I ſhall not ſay is malignant or wholely venomous, becauſe it brings little or no hurt, its particles being united, ſo that oftentimes a great quantity may be taken ſafely enough; yet the Mercurial little bodies, being divided and ſeparated one from another, (whether it be done by Chymical Salts, as in the Mercury ſublimate, and precipitate, or by ſtraining thorow the Pores of the Skin when they are anointed) immediately become fierce and untameable, and ſtir up, before any other Medicines, great perturbations in the humane body: They ſometimes bring trouble, firſt to the nervous parts, whereby oftentimes happen, (by reaſon of the Fibres of the Ventricle, Inteſtines, and other Viſcera's, being pulled or hauled) Torments, horrid Vomitings, ſharp and frequently Bloody-ſtools, Heart-burnings, Swoonings, and other moſt terrible Diſtempers, a little after the Medicine is given. Yet ſometimes the particles of the Mercury, when they are not preſently diſſolved, go forth without any great hurt to the Bowels, and before their ſtrength be deduced into the bloody Maſs. Therefore they eaſily enter into this, being highly active, and unfolding themſelves on every ſide, and immediately infecting the whole, ſhake

Whether ſalivation in inveterate Headaches, without any ſuſpicion of the Venereal Diſeaſe, ought to be adminiſtred.

The means and manner of ſalivation by Mercury, unfolded.

ſhake it, and frequently (when fully diſſolved) ſtir it up into a great burning. Then the Blood, that it might put away from it ſelf, the incongruous little bodies, Fermenting, delivers the ſame which way it can, and boils it with the humors, contained within its boſom, to wit, the Serum and the nouriſhing Juice, and ſo endeavours, with thoſe imbued with that preternatural mixture, to put it off. But this ſucceeds not plentifully enough by Urine and Sweat, becauſe the meltings of the Blood, by the particles of the Mercury boiled in it, like the ladder of a Waſh-Ball, become more clammy and thick, ſo that they cannot paſs thorow the fine ſtrainers of the Reins and the Skin, but oftentimes breaking forth (unleſs hindred) into the *Cæliac* Arteries, go forth, by exciting a *Diarrhœa* or *Dyſentery*; but by that the intent of Salivation is hindred or fruſtrated: but more often, the Liquor imbued with the *Mercury*, remaining within the Blood, in a manner alſo infected, is carried about with it, hither and thither, impetuouſly thorow the Arteries and Veins, and is ſeparated into various parts, and either breaks forth what way it can, or is forced upon the Bowels, Membranes, and other parts, oftentimes with great hurt. Alſo it is ſeen that ſome Mercurial particles do penetrate the Brain, and inſinuating themſelves into the nervous Juice, are diffuſed, not only into the whole Head, but into all the nervous parts, and ſo in ſome meaſure ferment the nervous Liquor.

But in the mean time the Mercurial Seroſities, reſiding in the Blood, are laid up for the greateſt part into the Glandula's, which are the neareſt Emunctuaries of the Arteries: wherefore, when the Glandula's about the parts of the Mouth (by which great plenty of Serum is deſtinated for ſpittle) being both many and great, are there placed, and that from theſe paſſages lye open, by the Excretory Veſſels, into the cavity of the Mouth; ſurely by this moſt certain way, the invenom'd liquor of the Blood, finds a paſſage forth, when it cannot eaſily elſewhere. Wherefore, a ſpitting at the Mouth being excited, the Blood long Fermenting, caſts forth whatſoever is extraneous, and not agreeable, either that lyes in its boſom, or that it licks up elſewhere from the Bowels, or receives from the ſolid parts, or from other humors, like working Ale or Wine, thorow the Salival paſſages, and innumerable pipes opening every where into the Mouth. Further, it is moſt likely, as the purgings of the Blood, ſo alſo of the liquor watering the Head, and the nervous Appendix, being excited by the Mercury entering therein, are alſo put forth by this way, to wit, by the Salival paſſages.

Therefore, a Salivation induced by Mercury, if by chance it ſucceeds rightly, it ſometimes takes away difficult and untameable Diſeaſes, not to be dealt with by any other Remedies; becauſe this operation thorowly purges the Blood and nervous Juice, and other humors, by a long purgation, deſtroys all exotick Ferments, overcomes the enormities of the Salts and Sulphures; yea, and ſhakes, and oftentimes carries forth the Morbific matter, where-ever remaining or impacted.

Salivation not always ſafe, wherefore to be ſuſpected in Headaches.

But this Medicine is not withont danger, foraſmuch as the Mercury becoming enormous, and carrying with it abundance of moſt ſharp, and as it were poiſonous Serum, ruſhing on the noble parts, and eſpecially the Head, with the Medullary and nervous appendixes, or on the Lungs, and parts about the Heart, brings to them an incurable and ſometimes a deadly evil. Wherefore in a more grievous and old Headach, there is danger leſt the indiſpoſed Fibres ſhould be more irritated, by the Mercury going thorow them, with much, and corroſive Serum, and ſhould move them into more painful Convulſions and wrinklings; further, leſt it ſhould invade the Brain, by a great falling of the Humors upon the Head, by which means, as it often happens to the Brain, ſleepy and Convulſive diſtempers are cauſed. I ſhould have ſaid many things more concerning this, but that we expect ſhortly to be made publick, by the Learned Phyſician Doctor *Needham*, an exact method of Salivation, and a full account of it, as to its meaſures and effects, and its benefits and hurt.

What the cutting of the Artery may profit in this Diſeaſe.

There is yet a celebrated Remedy remaining among Chirurgical helps, *viz.* a cutting or opening an Artery. This was of great eſteem among the Ancients, and ſome of the Moderns make uſe of it, and very much cry it up. But it appears to our obſervation, that this ſo cry'd up ſucceſs moſt often fails. Nor no wonder, becauſe reaſon holds not at all, on which the Ancients depended, that the Arterious Blood was different from the Venous, or that of the Veins, and was in greater fault and more rageing, and therefore to be let forth. Nor indeed is there any reaſon wherefore the Blood being drawn from the Artery, rather than from the Vein, near the pained place, ſhould bring eaſe; but rather on the contrary, more help ought to be expected from opening of the Vein; becauſe, the Artery being emptied, receives and draws nothing from the diſtemper'd part; but the Vein being opened, draws from the

the place of the effuſed Blood, and from its whole neighbourhood, and oftentimes ſups back, and renders to a Circulation the Blood, and other Humors, heaped up and ſtagnating near the neſt of the Diſeaſe. But however, that we may not recede too much from the practice of the Ancients, we ſhall grant, that ſometimes it may be helpful, though attributing nothing to the ſection of the Artery, and not immediately, yet cauſally, and only by conſequence and by accident: to wit, foraſmuch as the ends of the Artery being cut, grow faſt together, ſo that the paſſage of the Blood by that way is ſhut up for the future; from hence when as a leſſer proviſion of Blood is carried by the Artery towards the place: and the like ſtill carried away from it by the Veins, it therefore ſometimes happens, that the neſt of the Morbific Matter ſometimes leſſened, and its mine is by degrees conſumed. For this reaſon, this adminiſtration oftentimes ſucceeds happily in diſeaſes of the Eyes. Further, Farriers make uſe of the like practice for the Curing of evil tumors in the Legs of Horſes; to wit, they take and bind the Artery, by which the Matter flows to the diſtemper'd part, and in the mean time, that which was impacted, partly evaporates, and is partly ſupped up by the Vein. And I have heard, that the ſame has been try'd by our *Harvey*, and not without ſucceſs, for the Curing alſo of *Strumous* and *Scirrhous* Tumors in the humane body. I might here ſubjoyn many other kinds of Remedies, yea alſo the preſcriptions and forms of Medicines, which are wont to be adminiſter'd for the Curing of Headaches, both by *Phyſicians* and by *Emperick's*: but enough of theſe are to be had in Phyſical Books. It will be to our purpoſe, that after the delivering the *Ætiology*, or the reaſon of this Diſeaſe ſo confuſedly ſhown, and its *Therapeutic* or Curatory part ſufficiently ſhadowed, for the more clear illuſtrating of theſe things, that we add ſome more rare caſes of ſick perſons, and examples of a continual and moſt grievous Headach, which alſo for an invincible cauſe was oftentimes deadly.

Nevertheleſs in this Diſtemper it is often helpful, and by what means, is ſhewn.

Farriers uſe the like practice.

And perhaps it may be convenient for the curing of ſtrumous or running humours, ſuch as the Kings Evil.

A Woman of about fifty years of age, after ſhe had labour'd for about ſix months with a moſt grievous pain in the Head, troubling her almoſt perpetually, under the *Sagittal* Suture (or the ſeam that goes thorow the length of the Skull, dividing it into two parts) yielding to no Medicines, or method, at length fell into a *Lethargy*, with a partial reſolution of her members; from which notwithſtanding, being ſhortly recovered by timely Remedies, ſhe awaked with the Headach, as cruel as before; moreover, within two or three weeks after, relapſing into the ſleepy diſtemper, ſhe departed this life. Her skull being opened, there grew from the ſide of the third boſom, to the Membranes, a *Scirrhous* Tumor three fingers broad, by the coming between of which, both the *Dura mater* for a little ſpace was grown to the *Pia mater*, and the ſanguiferous Veſſels, which ſhould open there into the cavity of the boſom, were ſtopped up. Further, the cranklings or turnings in of the Brain, both the exterior and the inward cavity, was filled with a clear water. From theſe things being obſerved, the invincible and at length deadly cauſe moſt clearly appeared: to wit, the moſt ſenſible Fibres of the *Meninges* being continually pulled and torn, partly by reaſon of the breaking of the unity, and partly from the humor belonging to the Nerves, being there heaped up and ſtagnating, together with others flowing thither, and growing hot with it, were provoked into Convulſions perpetually, or painful Diſtentions: Afterwards, when the Blood being for a long time hindred in its circulation, by reaſon of that Tumor, or that at leaſt it could not paſs thorow it, by any means, ſent copiouſly away from it ſelf the Serous Water (as its manner is whereever it finds an hindrance) and at length a *Dropſie* in the Brain was raiſed, which was the cauſe of the deadly *Lethargy*. I remember I have ſeen the like caſe in another, whom I have opened. Further, as I think, the diſeaſe in many troubled with Headaches, doth depend on the like invincible cauſe; I will however deſcribe one example yet living, of this kind of Diſtemper.

The Hiſtory of a continual and a deadly Headach.

A continual and inveterate Headach paſſing into a Lethargy.

Some years ſince, I was ſent for to viſit a moſt noble Lady, for above twenty years ſick with almoſt a continual Headach, at firſt intermitting: She was of a moſt beautiful form, and a great wit, ſo that ſhe was skilled in the Liberal Arts, and in all ſorts of Literature, beyond the condition of her ſex; and as if it were thought too much by Nature, for her to enjoy ſo great endowments, without ſome detriment, ſhe was extreamly puniſhed with this Diſeaſe. Growing well of a Feavour before ſhe was twelve years old, ſhe became obnoxious to pains in the Head, which were wont to ariſe, ſometimes of their own accord, and more often upon every light occaſion. This ſickneſs being limited to no one place of the Head, troubled her ſometimes on one ſide, ſometimes on the other, and often thorow the whole compaſs of the Head. During the fit (which rarely ended under a day and a nights ſpace, and often held for two, three, or four days) ſhe was impatient of light, ſpeaking, noiſe, or of any motion, ſitting upright in her Bed, the Chamber made dark, ſhe would talk to no body, nor

A ſecond Hiſtory of an incurable Headach, in a moſt noble Lady labouring with it for twenty years.

take any ſleep, or ſuſtenance. At length about the declination of the fit, ſhe was wont to lye down with an heavy and diſturbed ſleep, from which awaking, ſhe found her ſelf better, and ſo by degrees grew well, and continued indifferently well till the time of the intermiſſion. Formerly, the fits came not but occaſionally, and ſeldom under twenty days or a month, but afterwards they came more often: and lately, ſhe was ſeldom free. Moreover, upon ſundry occaſions, or evident cauſes (ſuch as the change of the Air, or the year, the great Aſpects of the Sun and Moon, violent paſſions, and errors in diet) ſhe was more cruelly tormented with them. But although this Diſtemper moſt grievouſly afflicting this noble Lady, above twenty years (when I ſaw her) having pitched its tents near the confines of the Brain, had ſo long beſieged its regal tower, yet it had not taken it: for the ſick Lady, being free from a Vertigo, ſwimming in the Head, Convulſive Diſtempers, and any Soporiferous ſymptom, found the chief faculties of her ſoul ſound enough.

Remedies of every kind for the curing this Headach, try'd in vain.

For the obtaining a Cure, or rather for a tryal, very many Remedies were adminiſtred, thorow the whole progreſs of the Diſeaſe, by the moſt skilful Phyſicians, both of our own Nation, and the preſcriptions of others beyond Seas, without any ſucceſs or eaſe; alſo great Remedies of every kind and form ſhe tryed, but ſtill in vain. Some years before, ſhe had endured from an oyntment of Quickſilver, a long and troubleſome Salivation, ſo that ſhe ran the hazard of her life. Afterwards twice a Cure was attempted (though in vain) by a Flux at the Mouth, from a Mercurial Powder, which the noted Emperick *Charles Hues* ordinarily gave: with the like ſucceſs with the reſt ſhe tryed the Baths, and the Spaw-waters, almoſt of every kind and nature: ſhe admitted of frequent Blood-letting, and alſo once the opening of an Artery; ſhe had alſo made about her ſeveral Iſſues, ſometimes in the hinder part of her Head, and ſometimes in the forepart, and in other parts. She alſo took the Air of ſeveral Countries beſides her own native Air, ſhe went into *Ireland* and into *France*: There was no kind of Medicines both *Cephalicks*, *Antiſcorbuticks*, *Hyſterical*, all famous *Specificks*, which ſhe took not, both from the Learned and the unlearned, from *Quacks*, and old Women; and yet notwithſtanding ſhe profeſſed, that ſhe had received from no Remedy, or method of Curing, any thing of Cure or Eaſe, but that the contumacious and rebellious Diſeaſe, refuſed to be tamed, being deaf to the charms of every Medicine. Further, this ſo long poſſeſſing the out-parts of the Head, though it could not invade the cloyſters of the Brain; yet, when I viſited her, unfolding its ends in ſome other parts of the nervous kind, it had begun to ſtir up moſt cruel pains in her members, and alſo in her Loins, and bottom of her Belly, as is wont to be in the *Rheumatiſm*, and in the *Scorbutick Colick*.

Conjectures concerning the reaſon of this cruel Diſeaſe.

If we ſhould inquire into the *Ætiology* or the Cauſes of this inveterate Diſeaſe, we can ſuſpect nothing leſs than that the *Meninges* of the Brain, being from the beginning more lightly touched, had afterwards contracted an habitual and indelible vice. It appears by the Hiſtory, that the diſtemper at firſt aroſe from a Morbific matter, which was tranſlated into the Head, after an ill cured Feavour. Then perchance, by reaſon of ſome hurt brought to the Membranes, the tone of the Fibres was ſo much endamaged, that afterwards, the Humors flowing in them, both the nervous and others, being heaped up to a fulneſs, or growing hot by mere aggravation, raiſed up the fits of the Headach. But at length the diſeaſed cauſe growing worſe, by reaſon of the frequent fits, it ſeems that the unity of thoſe Fibres, were ſo much broken, that from thence little Tumors, or *Scirrhous* knots or ſwellings, being riaſed up in all the exterior *Meninge*, or in a great part of it, produced pains almoſt continual, and thoſe apt to be made worſe or imbitter'd upon every light occaſion: Certainly it ſeems moſt likely, that the invincible and permanent cauſe of ſo long, and yet not deadly Headach, proceeds from ſome ſuch thing, *viz.* a *Scirrhous* Diſtemper of the *Dura mater*, the *Pia mater* being in the mean time ſafe. For from any other cauſe, if there had beee a conflict of Nature and Medicine with the Diſeaſe, either a quick death or a joyful victory had far ſooner been obtained.

A third Hiſtory of a deadly continual Headach.

A noted Gentleman of about forty years of Age, ſtrong and healthy, going a journey for a whole day in a continual rain, the wet beating on the hinder part of his Head, caught cold, and the next day he began to feel a pain in that part; which in a ſhort time after becoming very bitter, afflicted him night and day, and kept him almoſt continually without ſleep. For the Cure of this Diſtemper, Phlebotomy, Purging, Gliſters, Bliſterings, and Remedies to cauſe reſt; yea and many others of every kind, though diligently applyed, by the Counſel alſo of many Phyſicians, helpt little or nothing. When the Diſeaſe notwithſtanding theſe, grew every day worſe, after a fortnights time, preternatural ſwell'd kernels and painful aroſe all about his Neck, the pain in his Head nothing remitting: Further, the Tendons of his Neck

being

being very much distended and stiff, became very troublesome to him; to which, in a short time, succeeded Convulsive motions, and a sudden leaping of the Tendons, in several parts, with a delirium, and at length, the sick person worn out with pains and watching, yielded to death.

A conjecture concerning the reason of the Disease.

Though we had not leave for the dissecting the dead body, yet it may be suspected, that both the *Pericranium*, and the *Meninges* in the hinder part of the Head, cloathing the *Cerebel*, where they are more thick and very nappy, were first affected; and then from thence the evil was afterwards communicated to the whole Head, and wandered into all the nervous stock: when as in those Membranes, transpiration was hindred, from the cold and the wet, and also the tone of the Fibres very much hurt, it is probable, that the nervous Liquor watering them, being then hindred in its motion, and stagnating, did burthen the containing bodies; then that being depraved in its Complexion, grew hot with other humors flowing thither, and being at length coagulated with them, grew together into *Scirrhous* and *Strumous* Tumors, and so laid the copious seed-plot of a most grievous Headach: Then afterwards, when through watching and perpetual pains, a great inordination of the Spirits, and a great *Discrasie* of the Juice watering the Head, were produced; for that reason, the knotty Concretions in the Neck, the stifness of the Tendons, and at length Convulsions and Convulsive Motions followed in the Brain, and in the whole nervous Stock: and so, when as ths animal œconomy or regiment was much decayed, and that the motion of the Præcordia could not be continued, the vital flame expired.

A fourth History of an Headach, excited from a fiery Swelling, or an Inflammation of the Meninges.

Sometimes deadly and incurable Headaches are no less raised up from a fiery swelling and Imposthum, than from these kind of knots, and little pimples of the *Meninges*. Sometime since, a young man of the University, whenas he had complained for a fortnight of a most grievous pain in the Head, incessantly afflicting him; it was at length increased by a Feavour, and afterwads, waking, Convulsive motions, and talking idly followed; at which time a Physician being sent for, letting blood, Clysters, Plasters, Revulsives, Blistrings, also internal Remedies which call away the Flux of the Blood and Humors from the Head, being carefully administred, profited nothing; so that death soon followed. His Skull being opened, the Vessels leading to the *Meninges* were full of Blood, and very much distended, as if the whole Mass of Blood had flowed thither, so that the bosoms being dissected and opened, the Blood presently rushing forth, flow'd to the weight of several ounces above half a pint: Further, the Membranes themselves being distemper'd thorow the whole, with a fiery Tumor, appeared discoloured: These coverings being taken away, all the infoldings of the Brain, and of its Ventricle, were full of a clear water, and its substance being too much watred, was wet, and not firm. Without doubt in this case, the incursion of the heated blood into the *Meninges*, and the heaping of it up there, exciting the *Phlgemon* or fiery swelling, was the cause of the Headach, and of the following *Delirium*: Then the Blood being accumulated there, when it could not circulate, flung from it self plenty of *Serum*, by which the whole inward part of the Head was over-flowed; so that the Disease, at first perhaps curable by Phlebotomy, from thence afterwards became mortal.

An History of an Headach raised up from an Imposthume in the Meninges.

I remember another *Academick*, who after a long Headach, under the temporal Suture, tormenting him perpetually for three weeks together, immediately fell into a deadly *Apoplexie*. His Head being opened, a fiery swelling had grown in the *Meninges*, near the place where the pain was, from which, being ripened and broke, the filthy bloody matter falling on the Brain, had distemper'd its substance with a rottenness and blackness. Besides, these invincible causes, detected by *Anatomy*, I observed more chances after the same manner, as of other sick people; by which we may conclude its *Ætiology*, to be the same, or very near of kin, with the signs and symptoms of the like nature, and but now described.

A continual Headach, not always to be accounted incurable.

But although a continual Headach (especially if it be without intermissions for many weeks) is not without danger: yet we ought not therefore to despair of its Cure, because the cause of this, how fixed and immoveable soever it seem, oftentimes by the long use of Medicines, and sometimes without them, is helped by Nature and time: however, in a case almost desperate, there is need of some Medicines, lest the present Distemper should pass into a worse, to wit, a Soporiferous or Convulsive. Thus much for a Continual Headach: it now remains, that we should propose some more rare examples and instances of the *Intermitting*.

An intermitting Headach, whose Fits are uncertain, are so frequent that we need shew no instances of it.

Therefore, that we may let alone here, the Headaches, whose fits being wandring and uncertain, proceed from the Blood or Serum rushing on the distemper'd places, as cases very well known, and commonly seen; we shall now shew you now some select Observations of this Disease, either periodical, or caused by the consent of some

lnward: As to the firſt, we have ſhown the periodical fits of the pains of the Head, to be produced by the nutritious Humor, or by the nervous Juice: we ſhall now ſhew you Examples of either.

The ſixth Hiſtory of a periodical intermitting Headach.

A venerable Matron of about forty five years of Age, of a lean habit of Body, and indued with a Cholerick Temper, after ſhe had lived for a long time obnoxious to Headaches, wont to be cauſed occaſionally, ſhe began about the beginning of Autumn, to be troubled with a periodical pain of the Head: This Diſtemper invading her about four of the Clock in the Afternoon, was wont to continue till midnight, when being wearied with pain and watching, ſhe was compelled to ſleep; then afterwards awaking out of a profound ſleep, ſhe found her ſelf well again. She being ſick after this manner for three weeks, ſuffered the daily fits of this Diſeaſe, and forbore to take any Medicine, which ſhe greatly abhorr'd; but at length her Appetite being loſt, and her ſtrength worn out, being forced to ſeek for Cure; after letting blood and a gentle Purge, ſhe took twice a day for a week or two, the quantity of a Cheſtnut of the following *Electuary*, and grew perfectly well.

The Cure of the ſame.

Take *of the Conſerve of the Flowers of Succory and Fumitory, each three ounces; of the Powder of the Root of Aron Compound two drams and a half, of Ivory one dram and a half, of yellow Sanders, and of Lignum Aloes, each half a dram; of the Salt of Wormwood one dram and a half, of Vitrial of Steel one dram, of the Syrup of the Five Roots what will ſuffice to make an Electuary.*

The reaſon of this Caſe unfolded.

In this Caſe, that after a diſpoſition to the Headach, the fits of the Diſeaſe became at length periodical, after the manner of intermitting Feavours, the cauſe without doubt was, the aſſimilation of the *Chyme*, or nouriſhing Humor, into Blood, being hindred: becauſe, when its proviſion being received into the Maſs of Blood, could not be overcome, it was wont after a little ſtay to diſagree, and with its particles, to grow hot; therefore preſently the Blood ſwelling up, that it might ſhake off the incongruous mixture, laid aſide its recrements, as in other parts, ſo eſpecially and with a greater ſenſe of trouble into the before weak Fibres of the *Meninges*, or hurt in their conformation: This Matter being poured on the Head, or ruſhing of it ſelf thorow the ſenſible Fibres, or growing hot with the Juice watering them, raiſed up the fit of the pain but now deſcribed; which continued until the heterogeneous particles growing hot, with their mutual coming together, were either ſubdued or exhaled.

The ſeventh Hiſtory of the ſame Diſtemper, excited by the default of the nervous Liquor.

A very comely Woman, tall and ſlender, being for a long time grievouſly obnoxious to diſtempers of the Head, was wont ſometimes to be troubled for many days, yea weeks, every day as ſoon as ſhe awaked in the Morning, with a moſt Cruel Headach, afflicting her for three or four hours: and in the mean time, ſhe was vexed with a weight of her whole Head, a numneſs of her ſences, and a dulneſs of mind: which kind of Diſtemper, together with the pain, like diſcuſſed Clouds, vaniſhed before noon, and left her quiet and calm: Then again the next morning, it poſſeſſed her Head like a dark Cloud.

The Cure of it.

For the Curing of it I preſcribed the uſe of Purging Pills, Phlebotomy ſparingly, beſides a Bliſtering, and Spirits of Harts-horn, or of Sut, with *Cephalic* Juleps or Waters.

The reaſon of the Caſe unfolded.

That in this Lady, otherways than in the other ſick Lady, the pains of the Head rather followed after ſleep, than were healed by it, the reaſon ſeems to be, becauſe in this morning Headach, the Morbific Matter reſided in the nervous Juice, whoſe more notable crudity, and fuller aggeſtion about the Head, happen immediately after ſleep, as we have elſewhere ſhown at large: But the other Evening fits of this Diſeaſe, depended upon the fulneſs and ſwelling up of the nouriſhing Liquor within the bloody Maſs, and therefore happening ſo many hours after dinner, was not allayed but by ſleep, which quiets the diſorders of the Blood.

An Inſtance of an intermitting Headach, which ſeem'd to be excited from the Womb.

It doth no leſs clearly appear, that the fits of the Headach do ariſe, ſometimes by conſent from other parts, *viz.* the Womb, Spleen, Stomach, *&c.* and though the complaints, and the experience of the ſick, declare it to ariſe from Vapors, yet from the Hiſtories of them, and their appearances rightly weighed, 'tis moſt clear, that this proceeds from another reaſon, than from Vapors carried to the Head from the diſtempered inward. And in the firſt place, as to the pains of the Head, that ſeem to ariſe from the Womb, there is nothing more frequent than that upon the ſuppreſſion of the Monthly Flowers, or the *Lochia* after being brought to bed, or (as they call it) the flooding, for cruel Headaches to ſucceed. Further, although the Terms do rightly flow, yet ſome at the inſtant of its flowing, others at the ſtopping of the ſame, are wont to be troubled with a cruel pain of the Head. But indeed, though

though at the ſame time, as the Head, the Womb alſo is diſtemper'd: however it doth not follow, that the evil is transferred from hence, thither immediately: but the Blood it ſelf, which fixes the Morbific Matter to the Head, carries it, ſometimes begotten in its proper boſom, and deſtinated to the Womb, wrongfully into the *Meninges* of the Brain; and ſometimes ſnatching it from the parts of the Womb, delivers it with greater malice to the Head. This ſame reaſon may alſo ſerve for the Headach, commonly attributed to the Stomach, Spleen, and other parts.

The eighth Hiſtory of an intermitting Headach, ſeeming to ariſe from the Stomach.

A beautiful and young Woman, indued with a ſlender habit of body, and an hot Blood, being obnoxious to an hereditary Headach, was wont to be afflicted with frequent and wandring fits of it, to wit, ſome upon every light occaſion, and ſome of their own accord; that is, ariſing without any evident cauſe. On the day before the coming of the ſpontaneous fit of this Diſeaſe, growing very hungry in the Evening, ſhe eat a moſt plentiful Supper, with an hungry, I may ſay greedy appetite; preſaging by this ſign, that the pain of the Head would moſt certainly follow the next Morning; and the event never failed this Augury. For as ſoon as ſhe awaked, being afflicted by a moſt ſharp torment, thorow the whole forepart of her Head, ſhe was troubled alſo with Vomiting, ſometimes of an Acid, and as it were a Vitriolick, Humor, and ſometimes of a Cholerick and highly bitteriſh: hence according to this ſign, this Headach is thought to ariſe from the vice of the Stomach.

A reaſon of this Caſe delivered.

That I may render a reaſon of this, firſt it appears, that a Vomiting will ſucceed a hurt upon the Head, to wit, after a blow, or wound, or a fall; yet a pain of the Head rarely or never follows, upon Vomiting, the pain of the Heart, or the Stomach, any otherways labouring, unleſs the Blood comes between. Wherefore in the aforeſaid caſe of the ſick perſon, as it appears plainly that the *Meninges* of the Brain were before diſpoſed to Headaches, its fits were ſtirred up by every agitation of the Blood; hence it is obvious to be conceived, when the heterogeneous particles are heaped up together to a fulneſs, in the bloody Maſs, by reaſon of the vice of the Chyle, preſently a flux of it ariſing, for the expulſion of the trouble, thoſe being but evilly match'd, being ſeparated by the Blood, and partly poured forth out of the Arteries into the Ventricle, do raiſe up its Ferment, and ſo produce hunger; and partly ruſhing into the prediſpoſed *Meninges* of the Head do there diſpoſe the tinder, or rather incentive of the Headach about to follow. This ſick Gentlewoman, averſe to all Phyſick, when ſhe would undergo no method of Medicine, at length became obnoxious alſo to Paralytick, and Convulſive diſtempers. Out of theſe it will be eaſie to deſign the reaſon of every other Headach, *viz.* of the *Hypochondriac*, *Hepatic*, or otherways *Sympathetical*, ſo that there need not here to be added any more Hiſtories or Obſervations.

The like reaſon is for other Headaches, ſeeming to ariſe from the Spleen, Liver, Meſentery, &c.

CHAP. III.

Of the Lethargy.

THUS far we have deſcribed, by what Diſeaſe chiefly, and after what ſort, the out-skirts of the Head, or the coverings of that encloſed within the Skull, are wont to be affected; and now deſcending to its more internal part, and which lyes next to the Cortical or ſhelly ſubſtance, we ſhall ſee to what diſtempers this part is found to be chiefly obnoxious. We have ſhew'd at large in another place, that the *Cortex* or ſhelly part of the Brain is the ſeat of the Memory, and the porch of ſleep: wherefore, we rightly referr the Diſeaſe, which is wont to cauſe an exceſs of ſleep, and an eclipſe or defect of memory, to wit, the *Lethargy*, to that Cortical part of the Brain.

The Seat of the Lethargy is the ſame with that of Sleep and Memory; to wit, about the Shell of the Brain.

The word *Lethargy* is wont to ſignifie two ſorts of Diſtempers, which are as it were the act and the diſpoſition of this Diſeaſe; for thoſe who are ſaid to labour with this Diſeaſe, or are ſick of its great aſſaults, are overwhelmed with ſo great ſleepineſs, that they can ſcarce be excited by any impreſſion of a ſenſible object, yea if by chance being prick't or pinch't, they open their Eyes, or move their members, preſently they let them fall again, and become inſenſible; and oftentimes when left to themſelves indulging a perpetual ſleep, by an eaſie tranſition, they paſs into death it ſelf, whoſe type this Diſeaſe is; which kind of fits, have often a Feavour joyned with them, which when the ſick awake, and return perfectly to themſelves, for the moſt part

By this name both the Fits of the Lethargy are called,

And also the soporiferous dispoſition, or Sleepineſs;

part ceaſes of its own accord. Or ſecondly, they are accounted *Lethargical*, who being oppreſſed with an immoderate torpor or numneſs of the ſenſes, are found to be almoſt ever prone to ſleep; ſo that in the midſt of a journey, yea at dinner, or though buſied about any thing, they preſently fall into a drouſieneſs. But as there are diverſe degrees, and various manners of this ſleepy diſtemper, ſo alſo they conſtitute the various kinds of this *Lethargick* diſpoſition. We ſhall for the preſent ſpeak firſt of the former *Lethargy*, and properly ſo called, and afterwards of continual Sleepineſs, alſo of the *Coma*, *Caro*, and other ſoporiferous Diſeaſes akin to it, and likewiſe of Continual Waking.

Of which there are various kinds: The continual Sleepineſs, the Coma, &c.

In every Lethargick Diſtemper there is an excеſs of Sleep, and a defect of Memory.

In the mean time, it is to be noted, that almoſt in every kind of Lethargy, there is always as its *Pathognomick* ſign, a Torpor or Sleepineſs, and oblivion or forgetfulneſs. Thoſe who ſuffer the more grievous fits of this Diſeaſe, if they are awakened by any force in their declination, forget all things, nor are they able to remember their own, nor the names of their Friends: alſo, thoſe who have drunk more ſparingly of this forgetful cup, as much as they are proclive to Sleep, ſo much are they deficient in Memory; ſo that they forget late actions, and oftentimes repeat things done, and very often ask the ſame queſtions: As to the other faculties, as Reaſon, Phantaſie, the ſenſitive and loco-motive powers, the failings or defects of them, are proportionate according to the enormities of Sleep and Memory. Wherefore, that the formal reaſon, and the cauſes of the *Lethargy*, may be the beter known, we ſhould here firſt of all diſcourſe concerning ſleep and oblivion, and for what cauſes they are excited.

The eſſence and cauſes of natural and non-natural Sleep, rehearſed.

But having already diſcourſed concerning the former of theſe, we ſhewed that the eſſence of Sleep did conſiſt in the corporeal ſouls withdrawing it ſelf by little and little, and contracting the ſphere of its irradiation, left deſtitute and as it were ſhut forth of doors, the outmoſt compaſs of the Brain, or its ſhelly part, and ſo the exterior, and all the organs of ſenſe and motion, from the emanation of the ſpirits; ſo that they for refreſhment ſake, being called inward, lye down and give themſelves to reſt; in the mean time, the Pores and paſſages of the outward part of the Brain, being free and empty from the excurſions of the ſpirits, are prepared for the coming of the nervous Liquor, ſtilled forth from the Blood, for a new proviſion of Spirits. In accuſtomed and natural Sleep, theſe two cauſes conſpire and happen together, as it were out of a certain mutual compact of Nature; *viz.* at the ſame time, the Spirits give place, the nervous Humor enters: but in unnatural ſleep, or that which is extraordinary, ſometimes this cauſe, and ſometimes that is the former; for the Spirits being wearied or called away, firſt withdraw themſelves, and ſo offer an entrance to the nervous humor heaped up before the doors; or elſe the nervous humor driving to thoſe places more plentifully, and as it were making its way by force, repels the Spirits, and entring into their paſſages, does as it were drown them: we have particularly aſſigned the various occaſions of either of theſe, and after what manner they come to paſs. Concerning the eclipſe or defect of the Memory, we need not ſpeak much here, becauſe it is wholely from the ſame cauſe, as immoderate Sleep, to wit, the excluſion, and an interdiction for a time, of the paſſing up and down of the Animal Spirits, from the exterior paſſages of the Brain, full of ſome humor.

The cauſes of preternatural Sleep are,

An infartion or obſtruction of the outward part of the Brain, and a receſs of the Spirits from thence: Sometimes this, ſometimes that, is the cauſe.

Preternatural Sleep, or an inſatiable ſleepineſs (which is the chief *ſymptom* in the *Lethargy*, and ſleepy Diſeaſes) ſeems to ariſe wholely from the ſame cauſes as nonnatural Sleep, carried forth only with greater force or energy; to wit, either the Animal Spirits, being firſt diſtemper'd, leave the outward compaſs of the Brain, and give an entrance, not only to the nervous, but to the ſerous, and ſome other vicious Humor; or elſe, the ſuperfluous and excrementitious humors, together with the nervous, break thorow the cortical doors of the Brain, and as it were overflowing its Pores and paſſages, drive thence and repel the Spirits; ſometimes this is chiefly the cauſe, ſometimes the former, and ſometimes both together. We ſhall firſt ſpeak of that which is the more frequent cauſe of the *Lethargy*, to wit, the eruption of either too much, or too incongruous humor, upon the confines of the Brain, and then afterwards of the departure of the Spirits from the affected part.

The Lethargy oftentimes from the ſerous heap overflowing the outward part of the Brain: And ſometimes from a Dropſie of the whole Brain.

I have often found by Anatomical obſervation, that the *Lethargy* doth ariſe from the Serous heap ruſhing into the outward infoldings of the Brain, and entering into its Pores and Cortical paſſages; for in many dead of this Diſeaſe, I found the ſpaces between the foldings of the Brain, full of clear water, yea and its outmoſt ſubſtance ſoft and infirm, from too much wet; moreover in ſome I found the interior cavities ſwelled with water, and the whole frame of the Brain overflowed with a Dropſie, or rather a flood. When therefore in a great and mortal *Lethargy*, it hath appeared that it has been after this manner, we may well ſuſpect in a leſſer and cureable ſleepineſs,

neſs, that the out-borders of the Brain, are at leaſt too much watered with humor, and the tracts of the Spirits overflowed; eſpecially if there appear any ſigns of water or of Serum, abounding about other parts of the Head.

A grievous ſleepineſs is wont to be excited, not only from the Serum being too much, or from the over plenty of any other Morbific humor, but ſometimes from its malignity: for it often happens, that a certain infeſtous and virulent matter is inſtilled from the Flood into the Brain, which entering the Pores of the Cortical ſubſtance, profligates the Spirits, and either extinguiſhing them, or driving them away inwards, ſo that this region being left deſtitute of them, a ſleepineſs and forgetfulneſs ſucceeds. There is none almoſt who hath not taken notice, that this often happens in malignant and ill handled Feavours: alſo in the *Scorbutick Cachexie*, the *Yellow Jaundice*, and certain other *Chronical* Diſeaſes, oftentimes a ſluggiſh and vapid or taſtleſs water is ſent in, inſtead of the ſubtil and ſpirituous nervous Juice, that is the parent of forgetfulneſs, and of ſleepineſs. *Not only a plenty of humour, but the malignity, often cauſes this Diſeaſe.*

This Conjunct Cauſe of the *Lethargy*, to wit, the heaping up of too much Humor, or too incongruous, within the ſhelly part of the Brain, depends upon other Cauſes, to wit, more remote leading cauſes, and alſo evident cauſes. As to the former, they are wont to be in fault, both when the Blood ſupplies the diſtemper'd part with Morbific matter, and alſo becauſe that the Brain it ſelf too eaſily admits it. *The procatarctick cauſes of the Lethargy. In what reſpect they are in fault;*

For indeed, the Blood transfers to the Head in ſome, a great quantity of a watery humor, and in others of a ſalt or ſcorbutical humor, alſo again in others excrementitious humors, and deadly to the animal government, ſometimes taken from theſe bowels, and ſometimes from thoſe; and as occaſion ſerves, inſtills them together with the nervous Juice, out of the Arteries on the outer borders of the Brain, and there by little and little inſinuating this kind of Morbific Matter, by a long congeſtion, cauſes a dark cloud, or elſe by a ſudden tranſportation of it, overflows at once all the outward part of the Brain, and drives away the inhabiting Spirits, like a Sea breaking in, and compels them to run more inwardly. *Both the Blood begetting evil humours, and ſending them to the Brain;*

But indeed the Morbific Matter, how copiouſly or infeſtous ſoever it be, and poured on the Head, doth not induce the *Lethargic* Diſtemper, unleſs the very weak or vicious conſtitution of the Brain be alſo in fault: for if this be ſtrong and of good temper, it eaſily reſiſts the aſſaults of all thoſe; yea it bears, without hurt, the errors and enormities in the ſix non-naturals. Thoſe who have this part too humid, or too cold, as Children and old Men; alſo, thoſe diſtempered with *Cacochymical* Humors, the *Dropſie*, *Scurvy*, or Humors gathered about the mouth of the Stomach, are very prone to ſleep, and ſometimes fall from a ſtronger Evident Cauſe, into a continual drowſineſs. Beſides, thoſe who have a weak Brain, and their Pores too lax or open, that by that means the feculencies obtruded from the Blood find a more eaſie paſſage, often become obnoxious to ſleepineſs, yea and to the *Lethargy*: for ſuch as are given to Surfeiting and Drunkenneſs, are wont preſently after to fall aſleep, which weakens the tone of the Brain, and fill, and too much open its Pores, with a crude and filthy Juice; ſo that when it hath been for a long time accuſtomed, by reaſon of theſe occaſions, to admit into them the Serous ſuperfluities, it afterwards refuſes nothing brought to it, but that its paſſages, like a courſe or wide ſtrainer, ſuffers all the groſſer particles, both Saline, watery, and earthy, eaſily to paſs thorow them. *and the Brain too eaſily receiving them.* *Upon what occaſions the Brain is prone to the Lethargy.*

Beſides theſe more remote leading cauſes (which become the act of the ſtirred up Morbific) there are more ſtrong Evident Cauſes, for ſo great danger does not hang over the Brain, as that its whole compaſs ſhould be invaded, from every morbid proviſion, nor upon every light occaſion, But there are many and diverſe occaſions, by which the ſleepy aſſaults are ſeen to be incited: the chief of theſe are great Surfeits, Drunkenneſs, eſpecially of Wine, or the Drinking immoderately of Strong-waters, then after ſuch exceſs to lye all night, or ſleep in the open Air: further, an evacuation of the Serum, by otherways, after having been long ſuppreſſed; alſo if Spaw-waters being drunk in a larger quantity, and not again render'd preſently by Urine, threaten a *Lethargy*. And ſo alſo do recrements of other Diſeaſes, either not well or not at all Cured, being tranſlated to the Head; ſo as a continual ſleepineſs often happens after acute Feavours, or ſuch as continue long, and other *Chronical* Diſeaſes, and eſpecially the Headach, Frenſie, *Empyema*, or collection of groſs Humors upon the Lungs and the *Colick*. *The evident cauſes of this Diſeaſe.*

Thus much of the *Lethargy*, whoſe aſſault proceeds from the *Cortex* or ſhelly part of the Brain, being affected; to which ſucceed either an eclipſe or an excluſion of the Spirits there inhabiting, with a ſleepineſs and oblivion. But as non-natural ſleep, ſo ſometimes what is preternatural, begins from the Spirits being firſt dejected; and which is uſual to ſucceed another Cauſe. It is obvious to any one, that this ordinarily *Another conjunct cauſe of the Lethargy conſiſts in the afflicting the Spirits with ſome narcotick.*

ordinarily happens from more ſtrong Opiates, without any previous flood or ſtopping of the cortical part of the Brain: for it is not probable that Narcoticks ſtir up the Humors, and ſend them to the Brain, when it plainly appears, that all the effervescences and flowings of theſe, are allayed by them. But if it ſhould be asked after what manner, and by what means, Opiates cauſe ſleep, and ſometimes a deadly Torpor or ſleepineſs, we ſay; That this Medicine is a certain kind of poiſon, beating down or extinguiſhing the Animal Spirits, by its blaſting; the Blood and ſolid parts in the mean time being almoſt untouch'd: Wherefore, when the Animal Spirits become raging, and as it were ſtruck with madneſs, running hither and thither, and will not be quieted and allayed, Opiates being adminiſter'd, like water flung upon a flame, deſtroy ſome of the outmoſt bands of them, ſo that the reſt being leſſened, and flying inwards, quietly lye down. We have at large diſcourſed of theſe things in a particular Tract, *Of the Operations of Medicines on the Humane Body*: For the preſent we ſhall note (which is to the purpoſe) that *Narcoticks* (or Medicines cauſing reſt) being taken at the mouth, do put forth their powers partly in the Ventricle, and indeed immediately, and partly in the Brain, both that and the Maſs of Blood mediating. By what means *Narcoticks* do operate, whilſt in the Ventricle, and provoke ſleep, we have ſhewn, *Chap. XV.* When they are moderate, in either province, they gently intoxicate ſome unquiet Spirits, and ſo immediately quiet the reſt; but if any one takes Opiates in too large a Doſe, he ſhall preſently feel hurt both in the Ventricle and in the Brain, and a little after being inſenſible, ſhall ſuffer a greater evil in either: to wit, a mighty heavineſs, and as it were an immoveable weight in the Stomach, which ſeems to opreſs both it and the neighbouring parts; indeed by this ſign, the Fibres of this place (the Spirits which before actuated them being broken) become without life, and as it were dead; then by reaſon of the Opiate, particles being carried about with the Blood, to the frame or compaſs of the Brain, and inſtilled into its Cortical or ſhelly part, the Spirits being driven away from thence or extinguiſhed, an irreſiſtable, and oftentimes a deadly ſleep follows: yea, I have ſometimes known, from a more grievous hurt inflicted on the Ventricle, only by the uſe of a more ſtrong *Narcotic*, Death it ſelf to have followed before ſleep could creep upon them, coming by a long way about. A ſtrong man vexed with a moſt cruel *Colick*, for eaſe ſake (whilſt a *Phyſician* was ſent for) took raſhly a great quantity of Opium; a little after he had taken it, he complained of a great burthen oppreſſing, and mightily weighing down the Ventricle: His Friends and the by-ſtanders gave him Cordial waters, Wine, and Strong-waters, but without any eaſe: This oppreſſion creeping wider about the Precordia, raiſed up pains and ſwoonings; but ſtill being awake, and conſtant in mind, he cryed out, that his ſpirits more and more failed him; till about three hours after, complaining that his ſight was gone, he preſently dyed.

How opiates cauſe Sleep.

How they operate in the Ventricle, and by what means in the Brain.

The Hiſtory of one preſently kill'd by taking too large a Doſe of Opium.

But that we may return to the *Lethargy*, as it is a Diſeaſe and not the effects of *Opium*, whence we digreſſed; concerning which we are yet to enquire, whether it may ariſe from a Narcotick Humor begotten in us, as ſome *Chymiſts* aſſert? We ſhall tell you our conjecture, that we think this 'tis ſufficiently plain, that there are other ſorts of Morbific particles produced in our Bodies, than thoſe commonly called Elementary and Humoral, and that they do affect after a various manner, *viz.* beſides the Watery, Earthly, Bilous, Phlegmatick, or Melancholic, we may find others *Vitriolick*, *Nitro-ſulphureous*, and others participating of enormous Sulphurs and Salts, and active to our evil. The Convulſive *Pathology* can by no other means be delivered and explained, unleſs by ſuppoſing that ſome extraneous little bodies, and as it were *Nitro-ſulphureous*, which ſticking to the Spirits, and at laſt caſt off by them, ſtir up the Exploſive, that is Convulſive force: In like manner we may think, that others of another nature may perhaps be begotten, ſuch as are of a *Sulphureous*, *Vitriolick*, or Narcotick nature, which when they creep into the Brain and nervous Stock, fall upon ſome Animal Spirits, which they by chance do meet, with extinguiſhing and fixing them, ordinarily induce their loſſes and eclipſes, ſuch as happen in the *Vertigo*, *Apoplexy*, or *Palſie*, as we ſhall more fully ſhew hereafter. In like manner, in a great fit of the *Lethargy*, though it be improbable, that theſe kind of *Narcotick* particles ſhould be in heaps derived from the Blood into the Brain, in ſo great a quantity, that they ſhould at once overturn the ſpirits dwelling in its whole precincts, and fix them; yet we may believe, that this may be ſome part of the Cauſe. Wherefore, in every long ſleepineſs, or *Lethargick* diſpoſition, we do ſuſpect the Animal Spirits, to be burthened with ſuch a *Lethæan Copula*, and that we ſhould direct the darts of every Medicine againſt it.

Sometimes a Lethargy ariſes from Narcotick *Particles begotten in the Body;*

Even as Convulſions from a nitro-ſulphureous, or exploſive matter.

Thus

Thus much concerning the formal reaſon, ſubject, and cauſes of the *Lethargy*, properly ſo called, the ſumm of all which is, That the Animal Spirits, the inhabitants of the exterior Brain, being hindred from their wonted motion and emanation, lye down in a profound and inextricable ſleep: but they are hindred either by the proper vice of themſelves, becauſe having taken or being diſtemper'd by ſome Narcotick, they are as it were coagulated and become immoveable; or becauſe their exterior tracts or paths in the Brain, are obſtructed and poſſeſſed by ſome ſtrange gueſt, ſo that there is no fit ſpace granted them for their expanſion.

What things belong to the Theory of the Lethargy.

The ſymptoms of this Diſeaſe, which now come in order to be explained, the chief are Sleep, and forgetfulneſs, or a ceſſation of every other knowing or ſpontaneous function, unequal and ſlow breathing, a Feavour, and oftentimes, the diſtemper growing worſe, Convulſions, a leaping of the Tendons, and at length univerſal and deadly Cramps or Convulſions.

Its ſymptoms.

As to the too former of theſe, we mentioned before, that Memory is deficient altogether for the ſame reaſon, as Sleep exceeds; to wit, foraſmuch as the Spirits inhabiting the outward part of the Brain, being either bound up or expulſed from their tracts, do not irradiate or beam forth from the Callous Body, into the Cortex or ſhelly part of the Brain, by which imagination or waking is made; nor do they, being carried inwards, and repeating their former footſteps, repreſent the Ideas or Images of things before acted. Indeed, Sleep, Watching, and Memory, are affections of the ſame parts and places: of which it is no light ſign, and which vulgarly appears by experience, that *Opiate* Medicines, by which Sleep is provoked, being often given, hurt the Memory. Yea I my ſelf knew one, having taken a ſtrong *Hypnotick*, or Medicine to cauſe ſleep, after being ſick with a Feavour, lived many nights and days without ſleep, and almoſt wholely loſt his Memory, eſpecially as to any thing long paſt.

The chief of which are, a ſleepineſs, and oblivion.

As to what reſpects the other faculties of the Corporeal Soul, to wit, the Imagination, Appetite or deſire, Senſe, and Motion, although no *Narcotick* or ſleepy chains are caſt upon the Spirits deſtinated to theſe offices, and that the Pores and paſſages of the interior Brain, within which they are wont to expatiate, are ſeen to be open enough, yet theſe Spirits, becauſe during the fit, they are denied their commerce with the others bound up, of themſelves lye down, and are overcome by Sleep. For as a continual ſleepineſs beginning about the root of the ſenſitive Soul, to wit, the Cortex or ſhelly part of the Brain, immediately its whole province is obſcured, as it were with a veil, to wit, the knowing, deſiring, and ſelf-moving part of the Soul, and alſo the intellect it ſelf, its windows being every where ſhut up, hardly ſpeculates, or beholds any thing.

By what means the other faculties of the Soul, to wit, the knowing, deſiring and locomotive, are affected.

Further, the power or force of this Diſeaſe, is ſeen to be extended to the other part of the ſenſitive Soul, preſiding o're the Cerebel and its Regiment; wherefore, during the fit of the *Lethargy*, the reſpiration and Pulſe are altered: for that becomes unequal and ſlow, ſometimes drawing the breath deep and long, ſometimes ſhort, repeated, and as it were double: and this being great and ſwift, diffuſeth a feavouriſh heat thorow the whole body.

The evil of the Diſeaſe reaches alſo to the Cerebel.

The reaſon of the former, if I am not deceived, is this, to wit, that the ſame Morbific Cauſe, which infects the outward part of the Brain, and its inhabitants, infects alſo in part the *Cerebel*, and the Spirits there ſerving for the motions of the *Precordia*; which being by that means diſturbed and hindred, though they omit not thir tasks, yet they perform them difficultly, and with interruption; hence the *Diaphragma* and Muſcles of the *Thorax*, do not ſo eaſily and ſwiftly as before, perform their *Syſtoles*, but laborioufly and with a longer ſtraining or endeavour, and ſometimes with repeated tryals or forces. This kind of unequal, long, and difficult breathing, frequently happens alſo in a Phrenſie; wherefore, ſome judge the cauſe both of this and that, to be from the inflammation of the Midriff or *Diaphragma*, but amiſs, becauſe the *ſymptom* in both theſe *Cephalick* Diſeaſes depends on the *Cerebel*, participating the hurt of the Brain, grievouſly diſtemper'd.

Hence breathing is often hurt, or altered.

This proceeds not from the Inflammation of the Midriff.

As to the Feavour of one troubled with a *Lethargy*, to be known by the great and quick Pulſe, hot breathing, with a burning of the Tongue and Mouth, without any heat in the extream parts, ſome deduce this from the ſame cauſe as the *Lethargy*, to wit, either from Phlegm putrefying in the Brain, or from a cold inflammation of the Brain Others on the contrary, affirm the Feavour to be the primary effect, and thence the Morbific Matter to be carried into the Head, from the burning Blood.

From whence the Lethargick Feaver.

Concerning theſe, we grant, that a *Lethargy* comes often after a Feavour, but we can ſay nothing of the Phlegm putrefying in the Brain, or of its frigid Inflammation, which is as much as to ſay, icy fire; for if this be malignant, or of evil cuſtom, happening

Not from Phlegm putrifying in the Brain.

pening alſo to Children, old Men, and other Phlegmatick, Scorbutick, or very *Cacochymical* perſons, or ſuch as are full of ill humors, about the height of a Diſeaſe, not well Cured, oftentimes in the place of a *Criſis*, the feavouriſh matter being ſnatch'd into the Head, induces a cruel and oftentimes a deadly Torpor or ſleepineſs; which notwithſtanding ought not to be eſteemed the ſymptom of the Diſeaſe, but of that Feavour. After this manner I have often obſerved, and elſewhere have particularly deſcribed, that Soporiferous Feavours, and as it were marked with a certain ſleepineſs, have raged and become *Epidemical*, at ſometimes, by reaſon of the evil conſtitution of the year.

Nor is the former always the cauſe of it in the Lethargy. Lib. de Morb. Convulſ. Cap. viij. p. 86.

But it is no leſs uſual when a *Lethargy* is the principal diſtemper, for a Feavour to follow, and to owe to it as much its original, as its Cure; for a Feavour beginning after a continual ſleepineſs, that being ſhaken off or diſcuſſed, ceaſes ſoon of it ſelf; ſuch a Feavour we think to ariſe, not from the Blood growing hot by reaſon of the ſtrife of inteſtine particles, but becauſe of the impulſe of the containing and neighbouring bodies, variouſly altering and diſturbing its courſe. For indeed the right temper of the Blood very much depends, not only on its particles being truly mixt and overcome, but alſo upon the motion impreſſed on the Heart and the Veſſels, or the Organical Circulation; to wit, that its Liquor may every where flow with an equal and alike flowing and ebbing; which, if finding any where a ſtop or Remora, it be retarded, its motion is made more impetuous, and with a Feavouriſh tumult in the whole channel beſides. This manifeſtly appears in violent paſſions, acute pains, a breaking of the unity, in all which the Blood being obſtructed in one place, or ſtraitned, it is ſnatched more vehemently in others, and conceives a Feavouriſh heat; for this cauſe, to wit, leſt the thread of its circulation ſhould be broken, on which life neceſſarily depends; wherefore as the Proverb ſays, *None dyes without a Feavour*: For how poor or deficient ſoever the Blood is, and that the ſtrength of all the moveing parts are weak, yet in the inſtant agony of Death, by the mere impulſe of Nature, they either purſue their functions, or the nervous Fibres every where erect themſelves, and put forth their utmoſt endeavours, that they might drive forward the Blood flowing in them, and Circulate it with a rapid motion. I once viſited an illuſtrious Lady, who for ſome time had been miſerably afflicted with *Colick* and Convulſive diſtempers, and quite worn out, and at length fell ſuddenly into a deadly *Lethargy*. When I perceived her Pulſe to beat ſtrongly, I preſcribed that four ounces of Blood ſhould be taken out of the jugular Vein, which immediately leap'd from the opened Veſſel, with ſuch force that, I believe, if it had been ſuffered, the whole Maſs of Blood would have flowed thence: for the next day after, her dead body being opened, I found ſcarce four ounces more of Blood in her whole Body, and yet ſhe dyed thus in a Feavour. The reaſon of the *Lethargick* Feavour is wholely the ſame, which is ſeen to ariſe only from the Vital Organs, being very much incited by labouring Nature, and therefore vehemently driving about the Blood.

More often the effect of this Diſeaſe proceeds from the Organical Circulation of the Blood, being hindred or altered.

How none dyes without a Feavour.

The *prognoſtick* of the *Lethargy* is ſhut within a ſtrait limit; for the fit of the Diſeaſe being for the moſt part acute, is ſoon terminated either in Death or health, and for the moſt part it is wont to give more of fear, than of hope. If it comes upon a malignant Feavour or hard to be cured, or if it comes upon other *Cephalick* or Convulſive Diſeaſes, as the Headach, Phrenſie, Madneſs, Epilepſie, or alſo upon a long and grievous Colick, or Gout, the *Phyſician* can predict nothing but evil: nor is it leſs to be feared if it happen in a Body full of evil Humors, or one long ſick, or in an old Man.

The Prognoſtick of the Lethargy. *When the Diſeaſe is deſperate.*

In like manner it is an evil omen, if the ſick, being preſently overwhelmed with a great Torpor or ſtupidneſs, and almoſt *Apoplectick*, cannot be awakened, and if he breaths unequally, and ſlowly, or with a great ſnorting, then the Diſeaſe increaſing, and the ſick troubled with tremblings, Cramps, leapings of the Tendons, and at length with Convulſive Motions, it is to be eſteemed deſperate or without hope.

When it is only ſo.

But if the Diſtemper be excited, without any great foregoing Cauſe, with an only Evident Cauſe, as a Surfeit, Drunkenneſs, or by the uſe of Narcoticks, a blow on the Head, or ſome not deadly ſtroke, we may expect the event to be leſs deadly or mortal.

When ſome hope may be conceived.

Then if the Diſtemper, ariſing from ſuch occaſions, happens to a Body before whole and ſtrong; if it does not wholly take away the Senſe and Memory at the firſt aſſault, and after a ſhort time the *ſymptoms* begin to remit a little, of ſuch a ſick perſon you ought not to deſpair.

From whence more hope may be had.

In every *Lethargy*, if any Cauſe of the Diſeaſe is ſeen to be cut off and removed, ſo that if by the help of Medicines, or the inſtinct of Nature, copious and helpful evacuations by Sweat, Urine, or by Stool do follow, with eaſe or help, or if by ap-

Whence more of hope than of fear.

plying

plying of Bliſtering Plaſters a great deal of water flows forth, if a ſwelling or great whelks or puſtles break out behind the Ears, or in the Neck, if frequent ſneezing happens, or water flow from the Eyes or Noſe, thence a certain hope of health may be expected.

A red Swelling coming upon a Lethargy ſometimes cures it.

Hippocrates l. Coac. c. 145. mentions a Cure of the *Lethargy*, to be often made by the diſtemper of the *Thorax*; ſaying, *That many Lethargicks that are ſtuffed with Phlegm have recovered:* Which words are wonderfully wreſted by Interpreters. *Mercurialis* underſtands by ſuppuration, the putrified matter of the Diſeaſe, to be evacuated by the Ears and Noſtrils. *Proſper Martianus* will have *Hippocrates* to be underſtood in the word *Lethargy*, not the diſeaſe of the Head, but of the Breaſt. But wherefore are all theſe ſubterfuges? when it often happens that the Morbific matter, at firſt fixed in the Head, and ſtirring up a continual ſleepineſs, or *Lethargy*; the ſame being thence ſupped up by the Blood, and depoſited in the breaſt, doth produce an *Empyema*, or a ſpitting like thoſe whoſe Lungs are waſted. In the deſcription of a Soporiferous Epidemical Feavour, which raged in the year 1661. we noted the ſame to have happened to many.

Lib. 9. *of Convulſive Diſeaſes.*

The Cure of the Lethargy.

Concerning the Cure of this Diſeaſe, for that it has no reſpite or truces, it is not to be deliberated on: after a ſharp Clyſter being given, let a Vein be opened preſently, for the Veſſels being emptied of Blood, they are more apt to ſup up the Serum, or other Humors depoſited in the Brain. Further, in this caſe, I adviſe rather to open the Vein in the Neck, than that in the Arm. Becauſe by this means, the Blood being very much heaped up, within the boſoms of the Head, and perhaps ſtanding ſtill, is more eaſily reduced to an equal Circulation.

Phlebotomy almoſt always neceſſary.

Outward Adminiſtrations.

Letting blood being performed, immediately other remedies of every kind are to be made uſe of: Let Veſicatories or bliſtering Plaſters be applied largely to the Neck and Legs; anoint the Temples and Face with Oyl of Amber, or *Cephalick* Balſoms; lay over all the Feet a *Cataplaſm* or Poultis, made of Rue, Crowfoot, and Pepperwort, with black Sope and Bay-ſalt; uſe hard frictions or rubbings to the Members, frequently apply to the Noſtrils Salt of Urine, or Spirits of *Sal Armoniac*.

Internal Remedies.

Then let there be adminiſtred Cephalick Remedies.

Julep.

Take *of the Water of Pœony Flowers, of black Cherries, Rue, and of Walnuts, ſimple, each three ounces; of the Water of Pœony Compound two ounces, of Caſtor tyed up in a rag and hung in the glaſs two drams, of Sugar three drams; mix them and make a Julep, let it be given about four or five ſponfuls every three or four hours; alſo with every Doſe of this, give twelve or fifteen drops of the Spirits of Amber, or of Sal Armoniac, or a paper of the following Powder.*

Spirits.

A Powder.

Take *of the Powder of the Root of Pœony the male, of a Mans Skull, of the Root of Virginian Serpentworth or Snakeweed, of Contrayerva, each one dram; Bezoar, and of Pearl, each half a dram; of Coral prepared one dram, make a Powder, and divide it into twelve parts.*

A Vomit or Purge.

Further, here it is to be conſidered, whether an evacuation, either by Vomit or Stool, ſhould not be made. I know that this is variouſly controverted among Authors, and I have alſo known it performed with various ſucceſs: which being weighed and laid together, I ſhall briefly propoſe my opinion.

How they are indicated.

If the *Lethargy* ſhould ariſe upon a Surfeit, or a late Drinking, or if from taking ſome diſagreeable things, or *Narcoticks*; preſently let a Vomit be given; wherefore, you may give Salt of *Vitriol*, with Wine and *Oxymel* of Squills; or in ſtrong bodies an Infuſion of *Crocus Metallorum*, or of *Mercurius Vitæ*, with black Cherry water. Let it be given, and if it doth not work of it ſelf, provoke Vomiting with a Feather thruſt down the Throat.

When to be avoided.

But if the fit of the Diſeaſe comes upon a Feavour, or any other Cephalick Diſtempers, or if it be raiſed up primarily, or of it ſelf, by reaſon of ſome foregoing cauſe before lying in the Blood or Brain, then a Vomit or Purge being given at the beginning, when the matter is flowing, doth oftentimes more hurt than good; becauſe the Humors whilſt in motion, are more ſhaken and agitated, and when they cannot be ſubdued and brought away, they drive them into the diſtempered part.

Scarification.

On the ſecond day, if the numneſs doth not remit, let Phlebotomy be repeated, if the Pulſe ſhew it fitting; or elſe inſtead thereof, take forth blood from the Shoulders, after Scarification by Cupping Glaſſes; then a little after (if nothing hinders) let a Vomit or Purge be adminiſtred.

Cathartick. Take *of the Sulphur of Antimony five grains, of Scammony ſulphurated eight grains, of the Cream of Tartar ſix grains; mingle them, make a Powder; let it be given in a ſpoonful of the afore preſcribed Julep.*

Or Take *of Scammony ſulphurated twelve grains, of the Cream of Tartar fifteen grains, of Caſtor three grains; make a Powder, and let it be given after the ſame manner: In the mean time, let altering Medicines, or ſuch as derive the matter from the place, the ſame or ſuch like, be ſtill continued.*

Errhines, Sneezing Powders, and Apophlegmatiſms, &c. On the third day, and afterwards ought to be applied ſuch things, which are forbid at the beginning of the Diſeaſe, for fear of a new Fluxion, *viz. Errhines*, or things that Purge the Head at the Noſe, Sneezing Medicines or Powders, *Apophlegmatiſms*, or Medicines which draw the Humors from the head by the mouth. Further, it is then ſometimes expedient to apply the warm intrails of ſome animal new killed, to the forepart of the Head, after the hair is clipped or ſhaven off, and often changed: alſo ſometimes to foment thoſe places with a Diſcuſſing and *Cephalick* Decoction, or Fomentation: but before all other *Topicks*, I have known great help brought from a large *Veſicatory* or Bliſtering, with many running ſores made all over the compaſs of the Head. I ſaw two ſick with the *Lethargy*, after the Diſeaſe held long, and that not only the Memory, but almoſt all knowledge was loſt, Cured chiefly by this Remedy: for in both of them, the fleyed places, when they could not be eaſily covered, poured forth great plenty of thin matter, about half a pint every day. It will not be needful to ſet down any more Medicines of this nature, being commonly and every where to be had; it now remains, that we illuſtrate what we have ſaid, with ſome Hiſtories of ſick people, which I ſhall here add.

A Bliſtering applyed to the Forepart of the Head very much helps.

The firſt Hiſtory. A Country-man about thirty years old, of a Phlegmatick Complexion, ſomething inclining to Sanguine, being a long time obnoxious to frequent Headaches, about the beginning of Winter, became ſleepy and very ſtupid; and one day, whilſt he was following the Plow in the Fields, lying down on the ground, he fell into a profound ſleep, and when he could not be awakened by his ſervant and others calling him, he was carried home and put to bed; his Friends in the mean time expecting that after he had finiſhed his ſleep, he would awake of himſelf. After the ſpace of twelve hours being paſt, when he could not be awakened by pulling, thumping, noiſe, and other means, they ſent for me; as ſoon as I came, I applied Bliſtering Plaſters, large ones, all about the hinder part of the Neck, then taking from him about ſixteen ounces of Blood, I cauſed him to take a ſtrong Clyſter, and his Face and Temples to be anointed with Oyl of Amber, and Frictions and painful Ligatures to be applied to his Legs. Alſo I preſcribed him to take oftentimes in a day, Spirit of Sut, with a *Cephalick* Julep. Notwithſtanding he lay all that day ſtupid, without any ſenſe; and if being provoked by ſome ſtrong or hard pulling, he lifted up himſelf a little, and opened his Eyes, preſently falling down again, and ſhutting them, he fell into his continual ſleep again. About Evening I took care to have Cupping Glaſſes, with a great flame to be applied to his ſhoulders, which done, he began a little to awake; and about that time he had a great ſtool, and very much Serum flowed forth from the Bliſters, the Plaſters being taken off, then we had great hopes of his health. And therefore at every turn, remedies being applied that night; awaking in the morning following he knew his Friends, and anſwered aptly to thoſe who interrogated him: But as yet the whole cloud was not vaniſhed, but that being ſleepy, he remained ſeveral days oblivious, till at length, being purged twice, he perfectly grew well.

The reaſon of this. This caſe has the exact type of the *Lethargy*, properly ſo called, where for the conjunct Cauſe, it had an heaping up of abundance of Serum about the compaſs of the Brain, and then a breaking in of it into its infoldings: and when by a timely uſe of Remedies, the flowing in of new matter was hindered, and that which lay upon the part was partly ſupped up into the Blood, and partly being rarified into Vapours and Effluvia's, was ſhaken off, the Cure of the Diſeaſe quickly and wholely followed.

A ſecond Hiſtory. An *Oxford* Gardiner being ſick of a Feavour, about the height of the Diſeaſe, inſtead of a *Criſis* he fell into a continual Sleep, and lay drowned in it for three or four days, ſo that he could not be awakened by the uſe of any Remedies: But at length, his Head being ſhaven, Bliſtering Plaſters were applied all over his Head, and many running ſores left open, and awakening he recovered the uſe of his ſenſes a little: But his Memory being almoſt wholely loſt, he became ſo ſtupid, that he remembered the name of no Man, nor their words, and remained like a Bruit. When he had thus remained fooliſh for the ſpace of almoſt two months, and ſtill very ſleepy, the cloud

cloud began a little to be diſpelled: and at length, he returning to his wonted labour, was in indifferent good health; but he never had afterwards the ſame vigor of mind and wit, as he had before this Diſeaſe. In this caſe you have an example of a *Lethargy* coming upon an ill Cured Feavour, in which the Morbific Matter, by a ſudden tranſlation of it into the outward part of the Brain, had for a little while filled, not only all the Pores and paſſages, but alſo had ſo hurt their Conformation, that the Spirits being for ſome time excluded, and at length freed, they could not recover their former paths, or wonted tracts, till of a long time after.

The third Hiſtory.

I remember very well, the example of a *Lethargy*, ariſing from the uſe of Opiates, in a Country Village where I lodged by chance one night, by reaſon of the foulneſs of the weather. For being about to go to bed, mine Hoſt asked me if I would viſit two poor people his Neighbours, diſtemper'd after a wonderful and miſerable manner. When I ſhewed my ſelf ready to do the office, not only out of Charity, but led alſo by curioſity, I was carried willingly into a ſmall and poor Cottage, where I found the Father an old Man, and his Son, both of them in two Beds in one and the ſame Chamber, overwhelmed with a moſt profound Sleep, which had oppreſſed them the day before, after they had eaten ſome roots, which they had dug up in the Garden, being it ſeems Henbane, which they took for Parſnips.

The Cure deſcribed.

After they had both Oyl and *Oxymel* poured down their throats, and a Feather thruſt down a great way, that made them vomit, I preſcribed for them tincture of *Caſtor*, with a ſpoonful of *Treacle*-water (which Remedies I had then about me) to be given them at every turn all night: beſides, that they ſhould anoint their Noſtrils and Temples with the ſame Tincture; and if it might be done, that a ſtrong Clyſter ſhould be given them: the following day the old Man firſt, and afterwards the Son awaking, returned to themſelves, the ſleepineſs being almoſt wholely ſhaken off. In theſe diſtemper'd, after the reliques of the *Narcotick* were caſt out by Vomit, leſt they ſhould do further hurt, there was only need, that by fit Medicines (among which *Caſtor* deſervedly is eſteemed to be contrary to the venom of *Opiates*) the Spirits being excited, ſhould be ſet free from the ſleepy poiſon afflicting them.

CHAP. IV.

Of ſome other ſleepy Diſtempers, viz. *a continual Somnolency, the* Coma, *or heavy Sleeping; and the* Caros, *or a deprivation of the Senſes.*

IN the former Chapter, we have fully ſhown what doth belong to the knowledge, *prognoſtick*, and Cure of the *Lethargy*, properly ſo called. But we did not only therefore affirm, that the ſeat of this Diſeaſe was in the unequal compaſs, the cranklings, or infoldings of the outward part of the Brain, becauſe we had there aſſigned the repoſitory of the Memory, and the porch of Sleep, (although we might from hence conclude it;) but beſides, becauſe it hath appeared ſo to me from *Anatomical* obſervations very often, that the *Lethargy* does not ariſe (as is commonly thought) from the interior Ventricles of the Brain being diſtemper'd: for we have known, theſe to be frequently overflown with water, and ſometimes diſtended with extravaſated Blood, and yet the ſick whilſt they lived, were free from the *Coma*, or any great ſtupidity. I muſt confeſs, that ſometimes the Dropſie of the whole Brain cauſes the continual ſleepineſs: but in this caſe not only the internal Cavity, but alſo the *Interſtitia*, or the ſpaces between the outward Infoldings, are filled with a flood of waters.

Sleepy Diſeaſes do not ariſe by reaſon of the Ventricles of the Brain being filled with water.

The *Lethargy* therefore being confined to the outmoſt borders of the Brain, we ſo conſtitute its limits, that thoſe circlings about, being almoſt wholely poſſeſſed, together with the interſperſed Marrow, perpetual and inexplicable Sleep, or hard to be rid of, with oblivion or forgetfulneſs, is induced; in the mean time, the middle part of the Brain, or the *Callous* body, from whence the Animal Spirits irradiate, or beam forth, into all parts both ſenſible and motional, being almoſt unhurt; for the total eclipſe of this cauſes the *Apoplexy*, as ſhall be ſhewed hereafter. But indeed on either ſides of theſe ends or limits, other ſoporiferous diſtempers are ordinarily found, which though of kin to the *Lethargy*, yet ſome of them are leſſer than it, as *Somnolency* or continual ſleeping, and the *Coma*; only one is greater, as the *Caros*. Therefore

The ends or limits of the Lethargy, as to the places diſtempered, are conſtituted.

Some ſleepy Diſtempers leſſer than that, viz. *Sleepineſs, and the Coma: The Caros is greater than it.*

fore we ſhall now, and in order, ſpeak briefly of every one of theſe, as alſo of ſome oppoſite paſſions, *viz.* thorow waking, and the waking *Coma*: and firſt of Continual Sleepineſs.

Continual Sleepineſs deſcribed.

Moſt Authors call this not a Diſeaſe, but an evil habit, or a ſleepy diſpoſition, for the diſtemper'd, as to other things, are well enough; they eat and drink well, go abroad, take care well enough of their domeſtick affairs, yet whilſt talking, or walking, or eating, yea their mouths being full of meat, they ſhall nod, and unleſs rouzed up by others, fall faſt aſleep: and thus they ſleep continually almoſt, not only ſome days or months, but (as it is ſaid of *Epemenides*) many years; wherefore we ought to believe this a Diſeaſe, and worthy of Cure, which defrauds one of more than half his life.

Its Seat aſſigned.

The ſeat of *ſleepineſs*, as that of the *Lethargy*, is to be placed in the outward part of the Brain; but with this difference; that the material or conjunct Cauſe of this Diſtemper, though it vexes, or troubles always without doors, yet it penetrates leſs deeply than the *Lethargy*; yea it diſturbs or affects almoſt the whole ſuperficies of the Brain, or the mere *Cortical* ſubſtances of the infoldings, the included marrow being almoſt untouch'd: in which reſpect, it differs not only from the *Lethargy*, but the *Coma* alſo; for in the Diſtempers which we deſcribed, though continual ſleep preſſes on them, yet 'tis eaſily broken off; then beſides, being fully awakened they remember many things, and converſe with their Friends, though immediately prone again to ſleep: whence it appears, that the cauſe of this Diſeaſe ſticks only in the outer border of the Brain, nor does it enter deep into its compaſs, as other ſleepy diſtempers do.

In what reſpect it differs both from the Lethargy and the Coma.

The conjunct cauſe of Sleepineſs.

But indeed it may be ſuſpected, that while the Blood every where waſhing the border of the Brain, with thick rivulets, and inſtils every where into it a ſubtil water, for the matter of Spirits, oftentimes a great plenty of water flowing thither with it, and entering together the *Cortex*, and remaining there, mightily fills it, and (like an *Anaſarca* in the Body) ſwells it up: But this *Cortical* or ſhelly part being ſwelled up after this manner, and as it were dropical, ſo preſſes the Medullary infoldings, every where lying under it, that the expanſion of the Spirits being hindred, by reaſon of the Pores of the exterior part of the Brain being ſomething bound up, ſleepineſs is induced; to which it happens, that the Blood, that by reaſon of the *Cortex* of the Brain being intumefied with water, as it were between the Skin, Circulates leſs expeditiouſly, thorow all the neighbouring parts, and ſo is apt to fill the Veſſels and boſoms, and to ſtagnate in them; by which means it comes to paſs, that the exterior border is yet more compreſſed, and ſo the ſpaces requiſite for the emanation of the Spirits, are alſo more ſtreightned. Indeed this appears to be part of the cauſe, from hence, becauſe this kind of ſleepineſs, by reaſon of the Blood not freely circulating in the Head, and therefore apt to ſtagnate, is wont to make red the Face, with a certain blueneſs and blackneſs: Further, whilſt the ſubtil Liquor, which is for the matter of Spirits, paſſing thorow this pond or deluge heaped together in the *Cortex* of the Brain, goes forward into the Marrow lying under, it is probable, that with it do creep thorow ſome extraneous, and as it were very ſmall *Narcotick* particles, which growing to the Spirits immediately render them torpid or ſtupid, and prone to ſloth of their own accord.

What the deluge or Anaſarca of the Cortical part of the Brain is.

To which happen an heaping up, or as it were a ſtagnation of the Blood, about the compaſs of the Brain.

Alſo a Torpor or Sleepineſs of the Spirits.

This Diſtemper, as I have obſerved in many, is not very dangerous, for as it often happens, it is wholely Cured, or at leaſt remaining for many years, without the *Carus* or *Apoplexy* (which is wont to be feared) it doth not become mortal or terrible. The Cure of this Diſeaſe often happens, the ſeat of it being changed, to wit, when clearing the Brain, the Morbific Matter is transferred to the *Cerebel*, which coming thither, produces tremblings of the Heart, the *Aſthma*, loſs of Spirits, and other troubleſome *Symptoms*, commonly taken for *Hypochondriacal*,

The Cure of Somnolency.

The Curatory Method ſuggeſts chiefly theſe intentions, to wit, that after a proviſion or foreſight of the whole, that (where it is convenient) Phlebotomy be performed, and a Purge given; then thoſe Remedies to be diligently adminiſtred, by which the Blood and the Brain may be freed from the watery deluge, and this latter may be ſtrengthened, whereby it may for the future receive and retain the Serous ſuperfluities. For thoſe ends, once or twice a week, may be given Pills of Amber, or of *Cochiæ*, with the Reſine of *Jalap*; at other times, let there be taken daily Morning and Evening, a Doſe of a *Cephalick Electuary*, or Spirits of Tincture of *Sal Armoniack*, Amber, Sut, with a *Cephalick* Julep: the forms of which may be picked out of thoſe above deſcribed. At eight of the Clock in the Morning, and at five in the Afternoon, let them drink a draught of *Coffee*, or the Liquor prepared of that Berry, firſt boiling in it, the leaves of *Sage* or *Roſemary*, till it has got a greeniſh

greeniſh Tincture. Let them drink for their ordinary drink, a Decoction of *Lignum Sanctum*, adding towards the end, the leaves of *Sage* or *Betony*, or other *Cephalicks*. Further, it is expedient that two large Iſſues be made between the Shoulders, and alſo frequent Bliſtering Plaſters be applied about the Neck. The hair being cut off, let a quilted thing of *Cephalicks* and Spices be worn under the Cap. Let them alſo hold their noiſe often over a Veſſel fill'd with Salt of Urine, or the Spirit of *Sal Armoniack*; let care be taken that they keep to an exact order of diet, and that thoſe attending the ſick, do not only rouſe them from ſleep, but daily at ſome ſet hours keep them waking.

A certain Gentleman of a Sanguine Complexion, and when he was young, of a ſharp and cunning wit, but afterwards growing aged, being given to idleneſs and drunkenneſs, became dull and ſtupid, and alſo Dropſical, with a great paunch, and his thighs and legs ſwelled. Yet from theſe Diſeaſes (which he frequently fell into) when he abſtained at any time from drinking, and took Phyſick, he oftentimes quickly grew well. But at length, though he was freed from the Dropſie, he was oppreſſed with ſo heavy a ſleepineſs, and that almoſt perpetually, that in what place ſoever he was, or what ever he was doing he would ſleep; then being awakened by his Servants or Friends, his mind appeared well enough, and for a few minutes he would diſcourſe of any thing well enough, then immediately fall again to ſleep. To this man I preſcribed, after he had taken in vain ſeveral Medicines, that every Morning and Evening he ſhould take of the Powder of the Leaves of Betony dryed in the Sun, and kept in a Glaſs, a ſpoonful in a draught of the diſtilled water of Lavender Flowers. By which Remedy finding eaſe, after a few days, he was perfectly Cured within a month, and enjoyed perfect health for four years after: Afterwards by reaſon of his evil manner of living, the ſame returned again, but the ſame Remedy found not the ſame ſucceſs; yea there was need of other Medicines beſides; ſometimes he took the Spirits of Harts-horn, or of Sut, with an appropriate Julep; ſometimes *Cephalick* Conſerves and Powders, to which ſometimes Steel was added. When he would indulge himſelf by Drinking, inſtead of Wine or Beer, he drunk Coffee; but for his ordinary drink, he had ſometimes Ale, with the leaves of Scurvigraſs, Sage, and Spices infuſed in it; and ſometimes with Woods, Spices, and *Cephalick* Herbs boiled with it: He lived thus for many years after, almoſt always intemperate, and full of groſs humors, yet free from the *Lethargy*; at length a *Cachexy* or evil ſtate of Body invading him, and waſting with a Cough and *Aſthma*, by degrees, he dyed.

An Hiſtory.

The Cure of the Sick deſcribed.

The next ſleepy Diſtemper before ſpoken of, greater than this laſt, and yet leſſer than the *Lethargy*, is that which is commonly called the ſleepy *Coma*. Thoſe troubled with this, are for the moſt part oppreſſed with an heavy ſleep, which they almoſt ſtill indulge, and lye with their mouth gaping, and their lower Jaw fallen down, more like dead than living perſons; being rouzed up by ſome ſtrong pulling or pinching, they look about, ſpeak to thoſe ſtanding by, anſwer their queſtions, but immediately ſleeping again; they are much troubled to be hinderd or diſturbed from ſleep ſo pleaſingly creeping on them. And thus indiſpoſed after this manner, they continue for many days, yea ſometimes months, ſleeping without any Feavour accompanying, or following it, nor have their breathing hurt, and not very forgetful, in which it differs from the *Lethargy*: Again, they differ from thoſe ſick of the Diſtemper but now deſcribed no leſs; becauſe, thoſe ſick of this *Coma*, are for the moſt part fixed to their Bed or Chair, and walk not abroad as the others, nor take any care of their houſhould affairs. They anſwer to any ſhort queſtions properly, but they cannot diſcourſe, or deliberate about doing any buſineſs.

The ſleepy Coma.

Without doubt, the Cauſe of this is of the ſame nature as the former, but of a middle degree between thoſe two but now deſcribed; for indeed, it may be well ſuſpected in this Diſtemper, that the Morbific Matter doth penetrate the Brain a little larger than in a Continual Sleepineſs: to wit, the turning cranklings, or Cortical infoldings, together with the ſmall Rivulets of the included Marrow are invaded: But yet they reach not to the greater boſoms of the Marrow, within the Callous Body, that are wont to be poſſeſſed in the *Lethargy*.

The reaſon of it.

The *Coma* ſometimes beginning firſt and of it ſelf, like the *Lethargy*, proceeds either from a Serous deluge poured forth from the Blood into the *Cortex* of the Brain; or elſe from a *Narcoſis*, or a ſleepy ſtupidneſs inflicted on the ſpirits dwelling there; and then, by how much this Diſtemper is leſſer than the *Lethargy*, by ſo much it is eſteemed leſs dangerous. But this Diſeaſe more frequently comes upon other Chronical or acute Diſeaſes, to wit, the Headach, Convulſions, and frequently ill-judged Feavours, eſpecially in Children, old Men and Women, and Phlegmatick people. Some time ſince, I obſerved in the Epidemical Feavour of the Nerves, (which I have elſe-

The Coma is either a primary Diſeaſe, or it comes after other Diſtempers.

where

where deſcribed) as ſome were *Lethargical*, ſo many were troubled with this Sleepy *Coma*; of whom many grew well, the Morbific matter being tranſlated from the Head into the Breaſt. Further, in other caſes, this Diſtemper of a doubtful event, between hope and fear, requires the careful pains of a prudent Phyſician.

The Cure of it when it is a Diſeaſe of it ſelf.

In the primary *Coma*, the Curatory Method ſuggeſts almoſt the ſame intentions of healing as in the *Lethargy*: as to the Morbific Matter, indeavour muſt be had, both that a new flowing into the Brain may be prevented; and alſo that what is already impacted, may be diſcuſſed or taken away. Further, the Animal Spirits ought to be rouzed up, or excited, and all ſleepineſs or ſtupidity ſhaken from them. For this end, ought to be applied Purging, Blood-letting, Cupping-glaſſes, Bliſtering Plaſters, repelling and diſcuſſing Topicks, and *Cephalick* Medicines to be given, and chiefly ſuch as are impregnated with a Volatile Salt, and many other means of adminiſtrations already recited.

The Cure of the Coma as it is the ſymptom of another Diſeaſe.

But if this Diſeaſe coming upon other Diſtempers, happens to a perſon, whoſe Body is already much worn out, the Blood vitiated, or greatly depauperated, you muſt ſeriouſly deliberate before taking away of Blood, or Purging: yea, alſo abſtain very much from them. Yet ſometimes that the Conjunct Cauſe, or matter of the Diſeaſe impacted in the Brain, may be put into motion, it may be expedient, to take away Blood moderately, either from the Forehead or Temples, by Leeches, or from between the Shoulders by Cupping-glaſſes and Scarification. Here Bliſtering Plaſters are in chief eſteem, to be applied not only to the hinder part of the Neck, or Head, but to the Legs and Arms, and other parts of the body, by turns. Further, let there be given frequently the Spirits of Harts-horn, of Sut, of *Sal Armoniack*, Amber, or a Mans Scull, Coral, and others, impregnated with other *Cephalicks*, with a *Julep*, or any other proper Liquor. The forms or Receipts of theſe, and of other Remedies, uſed in theſe caſes, together with the Hiſtories of the ſick, and examples of Cures, are extant in the deſcription of the aforeſaid ſoporiferous Feavor; ſo that there is no need to inculcate here again, the ſame, or ſuch like.

In Lib. *Of Convulſive Diſeaſes Chap.* viij.

3. Of the Caros.

There yet remains an other ſleepy Diſtemper, or kind of Lethargy or continual ſleeping, commonly called *Carus*, which is greater than the *Lethargy*, and ſomewhat leſſer than the *Apoplexy*, and is ſo near akin to this, that it often paſſes into it; but yet it is wont to be differenced from either: For thoſe ſick with the *Carus*, breath well for the moſt part, and when they are ſtrongly pulled, they move their Members, ſometimes lift themſelves up, open their Eyes, and often ſpeak, which *Apoplectical* perſons do not; yet the ſame, though excited or moved, do ſcarcely underſtand any thing, or plainly diſcern, in which reſpect they are diſtinguiſhed from ſuch as have the *Lethargy*.

How it differs from the Lethargy and the Apoplexy.

The Seat of the Caros is a little deeper in the Brain than that of the Lethargy.

From theſe it appears, that the Conjunct Cauſe of the *Carus*, doth penetrate deeper towards the middle part of the Brain, and hath its ſeat in the outmoſt border at leaſt of the *Callous* Body; wherefore the Animal Spirits, being reſtrained from their wonted expanſion, within this *Emporium*, the acts of the Imagination and Memory ceaſe, and although the Species being impreſſed from a more ſtrong ſenſible, is directed inwards, and oftentimes the local motion is retorted to it, yet becauſe this impreſſion reaches not to the *Callous* Body, by reaſon the Spirits are there amazed or ſtupefied, the ſick know nothing what they feel or do.

Its Conjunct Cauſe.

The Conjunct Cauſe of this Diſeaſe therefore, is very often the ſame, but ſomewhat more ſtrong, than that of the *Somnolency*, *Coma*, and *Lethargy*: The Morbific Matter is ſeen to poſſeſs both the *Cortex* of the Brain, and the Marrow lying under, and being carried forward, ſome greater boſoms of the middle part, and the upper borders of the *Callous* body; yea ſometimes, as this matter is partly carried forward by degrees, theſe Diſeaſes ariſe, and every next is but the augmentation of the former.

The Caros is either a primary Diſeaſe, or it cometh upon other Diſtempers.

But ſometimes the Morbific Cauſe, without any gradual progreſs thorow theſe parts, affects the middle part of the Brain at the firſt aſſault, and there (as it is more lightly or more deeply placed) cauſes the *Carus* or the *Apoplexy*. In which caſe, it is not to be thought, that the whole compaſs of the Callous Body, like the Cortical part of the Brain, ſhould be poſſeſſed by the ſoporiferous matter: becauſe it is ſufficient, this matter ruſhing into any one place, and invading ſome part of the middle Marrow, that preſently for that reaſon, an Eclipſe, or at leaſt a beating down of the Spirits follows, in all that region. After this manner it is wont to be, when the *Carus* comes upon a malignant or ill handled Feavour, or upon the Headach, or ſome Convulſive Diſtempers, or when it is excited by a blow on the Head, or by a fall, or by reaſon of an Impoſthum broken in the *Meninges*: for by reaſon of theſe accidents, the interior Marrow of the Brain is wont to be ſo preſſed together, ſhaken,

or

or otherways altered, that presently the tracts or paths of the Spirits are obliterated or blotted out.

The Prognostick of the Carus.

The prognostick of the *Carus* for the most part is but evil, especially if this Disease comes upon a malignant, or a long continued, a gentle and not Cured Feavour, or on a Woman in Childbed, no less danger is also threatned, if it follows after other *Cephalick* Diseases, or is excited by reason of a Wound in the Head: but yet in these cases, all hope of Cure is not presently to be cast off; for I my self have observed, some sick after this manner, and esteemed desperate or past all hope, to have recovered.

The event of this Disease is various, sometimes it passes into an Apoplexy:

The event of this Disease is wont to be various, either in Death or in health. The *Carus* passes not rarely into a soon killing Apoplexy, that after first the animadvertive faculty being lost, with a short breathing, and without motion, then by reason of the evil being transmitted to the Cerebel, there follow alterations of breathing and the Pulse, and quickly death it self.

Sometimes into the Palsie.

But sometimes the Morbific Matter setling more deeply, and falling from the *Callous* Body, into the streaked Body, one or both together, the Brain clears up a little, so that the sick look about them, talk, and know things, yet in the whole body besides, a Palsie, or Dead-Palsie on one side follows: but so, that life is not out of danger: for oftentimes, when the Brain begins to be restored, the *Cerebel* grows worse, that for that cause the Spirits there being evilly disposed or affected, which perform the offices of the vital function, and merely natural, either Convulsions are stirred up in the Bowels, and Precordia, or deadly impediments of the Pulse and respiration; yet sometimes when the Morbific matter is not so plentiful, nor very malignant, it is partly supped up into the Blood, and partly shook off, so that the sick grow perfectly well again.

Its Care is the same with the Lethargy and the Apoplexy.

The Curatory Method suggests the same intentions of Healing, and requires wholly the same Remedies, as those which are wont to be administred in the *Lethargy* and the *Apoplexy*. Wherefore, there will be no need to add here a company of Indications, nor to heap together a great pile of Medicines. But what seems more to the purpose, that I give you one or two Histories of sick people, of which I have many by me.

The first History.

A known person of about forty years of Age, who having through Intempernace lost his health, took I know not what Medicines, prescribed by an *Emperick*, and fell into the *Carus*; perchance it was becaus̃e the Morbific Matter being moved and agitated by the Medicine, it rushed into the Head. Visiting this Man on the second day, I found him buried in a profound sleep, and almost insensible; for although he opened his Eyes, moved his Members, when prick'd or strongly pull'd, yet presently sleeping again, he perceived nothing of what he did or suffer'd. Though in this case, I could prognosticate nothing but what was sad, however I did not desist from giving him my Medicinal help: abstaining from letting of blood, his strength being worn out, and his Blood depauperated, I took care for a large Blistering Plaster to be applied to the hinder part of the Neck, and a strong Clyster as soon as I could, to be given him, made of a Decoction of *Briony* Roots, with *Carminative* Flowers and Seeds, adding thereto of the Species of *Hiera* two drams: his Nose and Temples were anointed with Balsoms. *Cataplasms* of Rue, and the Roots of *Bryony* were laid all over his Feet. Besides, every other, or every third hour, I order'd him to drink a Dose of the Spirits of Harts-horn, with a *Cephalick Julep*; yea, and I took care to have administred several other administrations, used in this case. By which, when the Disease did not wholly give place on the following day, I prescribed a Purge of prepared *Scammony* to be taken in a spoonful of Broth; by which, when he had gone often and plentifully to Stool, he began to open his Eyes, speak to, and to know those standing about him, and a little after returning to himself, he fully awaked. This Disease therefore (as I think) was easily and quickly Cured beyond hope, becaus̃e that cloud, being by chance sent into the Brain by Physick, might the better be deduced thence by the help of other Physick.

Another History.

A noble person about fifty, fat in body, and in time past obnoxious to the *Vertigo*, and to *Asthmatical* Distempers, using for two years Physick every spring and fall, having also a large Issue between his shoulders, lived in indifferent health: The Summer coming on, and he living in the Country, neglected his Issue for several weeks, so that the recrements there, flowed much less than they were wont; yet he was still well, till about the *Solstice* (or middle of *June*) when one morning chearfully talking with his Friends, sitting in the Porch of his House, rising suddenly he complained, that he was not well; and going into the House, sitting down in a Chair, immediately leaning backward, fell into a profound sleep, and lay so buried in it, that all that

day he could not be awakened. Coming to him in the Evening, I took care to have *Phlebotomy* adminiſtred, and alſo a *Clyſter*, a *Veſicatory*, and many other Remedies, proper in ſuch a Caſe. On the next day, his Brain began a little to grow clear, ſo that he looked about him, and ſpake a few words; he ſeem'd to know his Friends, but could not utter the name of any; but by reaſon of this matter ſinking down more deeply into the Brain, a Palſie ſeized his whole right ſide. Further, when as yet his great ſleepineſs continued, that day Blood was taken out of the other Arm, and alſo other Remedies as the former, were continued: On the third day, being leſs ſtupid, he knew many, and could tell the names of ſome of them, he perceived then his own ſickneſs, and began to be careful for the taking of Remedis. But indeed, whilſt his Brain grew better, the evil ſpread it ſelf on the *Cerebel*, and the nervous Stock; for on the fourth day, his breathing became unequal, and more laborious, his Pulſe weaker, and his whole body troubled with a ſtifneſs, and Convulſive ſhakings: On the fifty day, more cruel Convulſions and Cramps did more often infeſt him; then his Pulſe by degrees leſſening; on the ſixth day, though more freed from his ſleeping, he dyed. In this caſe, and in others like it, 'tis probable that the Morbific matter did at once invade the Brain and the *Cerebel*, but whilſt it ſtuck in the *Cortex* of this latter (contrary to what happens in the Brain) it cauſed no ſenſible hurt, becauſe this part, which was hurt, was neither the ſeat of Sleep nor of the Memory; but afterwards, perhaps on the fourth or fifth day, the matter ſinking down from thence, to the middle parts of the *Cerebel*, whilſt as to the other Diſtemper the ſick grew better, the vital function, by reaſon of the ſpirits deſtinated to it being oppreſſed in their fountain, began to faint, and afterwards ſuddenly declining, took away unexpectedly all hope of recovery, which before ſeemed favourable.

CHAP. V.

Of thorow or long Waking, and of the Waking Coma.

EVEN as Light and Darkneſs, ſo Sleep and Waking, being placed nigh together, beſt illuſtrate the natures of one another; ſo that it will be to the purpoſe, after the Sleepy Diſtempers, to diſcourſe here of preternatural Watching, or Waking; to wit, foraſmuch as it exceeding its limits, and hurting ſome functions, is both a Diſeaſe, and requires Cure. In this rank there are commonly two Diſtempers, to wit, thorow or long Waking, and the Waking Coma; of both which we will now ſpeak in order.

Long Waking is either the ſymptom of other Diſeaſes, or elſe is a Diſeaſe of it ſelf.

Concerning thorow Waking, we muſt here firſt diſtinguiſh, to wit, that it is a ſymptom coming upon ſome other Diſeaſe, as a Feavour, Phrenſie, Madneſs, the Colick, Gout, or ſuch like; then the Cure and conſideration of it belongs to that diſtemper, whoſe iſſue it is: or elſe immoderate Waking, ariſing of it ſelf, without any notable ſickneſs, is ſeen to be a Diſeaſe almoſt ſolitary or alone of it ſelf. So I have known ſome, free from any Feavour or pain, well in their Stomach, and fit enough for their buſineſs, being in Bed, could take no more Sleep than the Dragon of the *Heſperides*. Some troubled with this kind of Waking, though deſtitute of Sleep, ſcarce ſeem to want it it; for their Spirits appear neither ſluggiſh, or weary, or exhauſted: but others hardly bearing watching, become from thence languiſhing, and without Appetite, and are forced to fly to *Opiates*, which ſometimes they uſe daily, and in a large Doſe unhurt.

The cauſe of natural Waking conſiſts in the reſtleſsneſs of the Spirits, and the openneſs of the Cortical part of the Brain.

We have before hinted, that the Cauſe of Natural Waking, which is interlaced with Sleep, conſiſts in theſe two things, either in one of them, or both together; to wit, firſt that the Animal Spirits being ſufficiently refreſhed, and freed from the ſtocks of the nervous Liquor, do come forth lively, and are on every ſide ſtreamed forth, and chiefly from the middle part of the Brain into its circumference; then ſecondly, although they obtain every where an open ſpace, and eſpecially in the exterior compaſs of the Brain, then freed from the incurſions of the nervous Juice, yet leſt this expanſion of Spirits (which is waking) ſhould be protracted to their loſs, longer than is fit, the Spirits by it being wearied, become faint, and as it were lye down of their own accord, and at the ſame time, the nervous Liquor being poured into the *Cortex* of the Brain, ſtops or ſhuts up their paſſages. Hence it follows, that preternatural

ternatural Waking, or that which is immoderate depends upon theſe two, either on one or both together; for either they being grown too outragious, and as it were ſtruck with a fury, will not lye down of themſelves, or the nervous Liquor doth not ſo fill and ſtop up the Pores of the outward part of the Brain, that from thence the Spirits may be compelled inward to reſt: Examples of both of theſe are ordinarily to be met withal.

In like manner alſo preternatural Watching depends upon one or both.

And firſt of all we ſhall take notice, that the Animal Spirits, ſometimes becoming outrageous and ſo *Elaſtick* or ſhooting forth, or otherways enormous, that they will not only not lye down and be quieted, but ſcarce be contained within the proper ſphere of their emanation; wherefore, being ſpread abroad in continual waking, ſo fill the Brain, and keep it extended, that the nervous Juice though it lyes heaped up at their doors, cannot be admitted; but if it enters of it ſelf, and the Spirits are called back inwards, from the Cortex of the Brain, preſently they being forced thither, or tumultuating within the middle part of the Brain, raiſe up many, and often moſt horrid phantaſies, whereby ſleep is driven away; or directing thence their declination further, into the nervous Stock, there ſtir up great diſorders, which continually drive away, and break off Sleep, though it ſeems ready to creep upon them.

The former means deſcribed, by ſhewing how many ways the unquiet or elaſtick Spirits ſtir up long waking.

As to the former of theſe, I have often obſerved, that ſome being diſturbed with waking, were afraid to ſleep, though deſiredly coming upon them; for as ſoon as they ſhut their eyes to ſleep, preſently leaping up, they would cry out they ſhould grow mad, with a multitude of confuſed phantaſms, ſo that they were neceſſitated to abſtain from ſleep.

Firſt, Becauſe being recalled for Sleep into the middle part of the Brain, they grow tumultuous.

Secondly, whilſt the Spirits become more outrageous, and are for ſleep ſake recalled towards the interior compaſs of the Brain, ſometimes they convert their rage into the nervous Stock, and then tumultuarily ruſhing in upon the Nerves, deſtinated for the Precordia, or the Inwards, raiſe up inordinations in the reſpective parts: hence in thoſe thus diſtemper'd, as often as they ſhut their eyes to invite ſleep, either tremblings, leapings, and binding up of the heart, with loſs of Spirits, and breathing ſtopped, or inflations, and riſing up of the Bowels, with a ſenſe of choaking, and other ſymptoms commonly called or taken to be *Hyſterical*, follow: or elſe ſecondly, the Spirits being recalled from their watches, and turning on the nervous Stock, transfer their rage ſometimes on the ſpinal Marrow, and the Nerves reaching from thence into all the exterior Members: Wherefore, in ſome, whilſt they would indulge ſleep, in their beds, immediately follow leapings up of the Tendons, in their Arms and Legs, with Cramps, and ſuch unquietneſs and flying about of their members, that the ſick can no more ſleep, than thoſe on the Rack. Once I was conſulted with for a noble Woman, who was in the day-time cruelly tormented with the pain about the heart, and Vomiting, but in the night ſhe was hindred from ſleep, though it ſeemed to approach, by reaſon of theſe kind of Convulſive Diſtempers invading her, with it; nor indeed could ſhe ſleep all the night, unleſs ſhe had before taken a large Doſe of *Laudanum*; wherefore, this Medicine at firſt being permitted her, only twice a week, afterwards ſhe took it daily for three whole months, contracting by it no hurt, either in her Brain, or about any other function; and when in the mean time, by the uſe of other Remedies, the *Dyſcraſies* of the Blood and the nervous Juice were amended, and the Animal Spirits were made more benign and gentle, ſhe having after that wholly left off her Opium, could ſleep indifferently well. Theſe kind of ſleep-deſtroying Diſtempers, ſtirred up either within the middle part of the Brain, or within the nervous Stock, either more inward or more outward, do depend wholly on the evil conſtitution of the Animal Spirits: for thoſe who ought to be gentle, clear, and bright, and to actuate gently the containing bodies, and to influence them with a benign influence, become ſharp and fierce, and like Effluvia's ſent from *Stygian* Waters, unable to be reſtrained, do diſtend them too much, and refuſe to be governed by the command of the will, and to be quieted by ſleep; yea being reſtrained in one place, they immediately grow tumultuous in another. Such a conſtitution of the Animal Spirits proceeds from the acid, and oftentimes as it were Vitriolick Dyſcraſies of the Blood begetting it, and of the nervous Juice cheriſhing and increaſing it: as ſhall be more fully ſhewed hereafter, when we ſpeak of madneſs.

Secondly, Becauſe being called back into the nervous Stock, they impetuouſly leap forth.

And ſo, either into the interior Nerves, ſerving the Præcordia and Viſcera;

Or, into the Spinal Marrow, and the exterior Nerves.

The cauſes of the aforeſaid Diſtempers aſſigned.

In the mean time, as to what belongs to the Cure of thorow or long waking, (which we but now deſcribed) becauſe it cannot be long tolerated, therefore thoſe things, which may bring preſent eaſe, ought firſt to be adminiſtred; for this end, thoſe things which ſooth the Spirits, and gently moderate their diſorders, are convenient, as thoſe commonly called *Anodynes*, *viz.* Diſtilled Waters, Decoctions, Syrups, and Conſerves of the Flowers of Water-Lilies, Cowſlips, Mallows, Violets,

The Cure of them declared.

Hearts-eaſe, of the leaves of Willow, Lettice, Purſlain, alſo Emulſions, or Juicy expreſſions. If that the unquiet Spirits will not be allayed by gentle flatteries, you muſt compel them into quietneſs, as it were with bouds and ſtrokes: plenty of them ought to be diminiſhed, and the places alſo to be inlarged, in which they may expand themſelves in freedom, and without tumult, and quitted from the intanglements of other Humors, to wit, of the Blood and Serum: For which ends, ſometimes the opening of a Vein is convenient, and Bliſterings are always to be made uſe of; alſo *Diacodium*, and *Laudanum*, if it be convenient, are frequently given; and in the mean time, whilſt that *Opiates* give ſome truce to the Diſeaſe, the cauſe of it ought carefully to be rooted out by the uſe of other Remedies, as much as may be; wherefore, ſuch as take away the ſharpneſs of the Blood and nervous Juice, and render a ſweetneſs to them, are to be adminiſtred, day after day, in Phyſical hours: In which rank are ſhelly Powders, *Apozems*, and Diſtilled Waters; Alterers, made out of temperate Antiſcorbuticks; the more gentle prepared *Chalybeats*, Spirits of Harts-horn, and of Sut, and almoſt before all other things, the Tincture of *Antimony* is much eſteemed.

The ſecond ſort of thorow or long waking, ariſing both from the too much openneſs of the Brain, and from the unquietneſs of the Spirits;

There remains another ſort of thorow or long Waking, the cauſe of which in ſome, if not in the greateſt part, conſiſts in almoſt a continual openneſs, or too much gaping of the Pores, or paſſages in the *Cortex* of the Brain: For beſides, that the Animal Spirits becoming ſharp, and ſomewhat outragious, refuſe to lye down of their own accord, and to indulge reſt; moreover, no ſtop or yoke is impoſed upon them from the nervous Liquor, entring into the Pores of the Brain, but being free and quitted of all burthens, they are alſo expanded within the exterior ſpaces of the Brain, every where open: wherefore, for this cauſe, thoſe troubled with long Waking, feel no ſleepineſs or heavineſs in the fore part of their head, no deſire or approach of Sleep. I have known ſome diſtemper'd after this manner, who, when they had lived for many nights continually without Sleep, ſeemed ſtill chearful, active, ſtrong in their ſtomach, and ready for buſineſs, and not to want Sleep. The cauſe of this without doubt is, becauſe the burnt and melancholy Blood, ſupplies the exterior part of the Brain with a nervous Juice, that is not ſoft and favourable, but too much parched, and ſtuffed with aduſt particles, which, for that reaſon, is apt neither to ſtay long within the Pores of the Brain, nor gently to embrace and hold the Animal Spirits. Further, the Spirits themſelves, procreated out of it, become of their own nature too *Elaſtick*, and unquiet, ſo that they are not eaſily ſetled, or are prone of their own accord to Sleep: But theſe more fixed, do not readily fly away, nor being wearied, do ſuddenly grow faint, but indure for a long time, without any great refection, and yet remain lively. Concerning this waking diſpoſition of the Animal Spirits, as it is the ſame in *Melancholicks*, we ſhall have an opportunity of ſpeaking of it more largely hereafter. We may alſo here take notice, that for the ſame reaſon (to wit, that the aduſt Particles of the Melancholick and torrid Blood, being poured into the Brain, together with the nervous Juice, cauſes waking) the drinking of *Coffee* alſo, (in uſe formerly among the *Arabians* and *Turks*) which is drunk by our Country Men, either Phyſically or out of wantonneſs, all ſleepineſs being driven away, doth produce unwonted waking, and an unwearied exerciſe of the Animal faculty; that ſome having a neceſſity to ſtudy late in the night, or preſently after drinking, or a full meal, by drinking a due quantity of this Liquor become ſtill waking, and perform any hard task of the mind, without ſleepineſs. Surely the cauſe of this is, becauſe this drink inſinuates aduſt particles (of which it is full, as may be perceived both by the ſmell and taſte) immediately into the Blood, and then into the nervous Juice; which ſtill detain the pores of the Brain open, by their agility and inquietude, and add to the Spirits, all ſleepineſs being ſhaken off, certain provocatives, and madneſs, by which they are excited to a longer performance of their offices. Further, we ſhall deliver afterwards, where we ſpeak of Melancholy, thoſe things which belong to the preventive Cure of this long waking, or the removing of the Morbific cauſe: In the mean time, for the taking away immediately this *ſymptom*, as often as it is grievouſly troubleſome, we noted that *Opiates* were little profitable; for a bare Doſe being given, doth rarely cauſe ſleep, and render the ſick more weak and languiſhing: It often better ſucceeds, if they go to bed, and take ſome ſoft and pleaſing Liquor, as our own Ale, clear and mild, or Poſſet-drink with Cowſlip Flowers boiled in it, or an Emulſion of Melon Seeds, and Almonds in a great quantity, to wit, two or three pints.

its foreleading Cauſe.

Which alſo cauſes waking in Melancholick People.

For the ſame reaſon Coffee cauſes waking.

An Hiſtory ſhewing an example of this Diſeaſe.

I was ſome times paſt conſulted with about an old *Hypochondriacal* perſon, who beſides other *Symptoms* uſual in that caſe, was for many years obnoxious to frequent, very troubleſome, and noiſie belchings: he was wont every day, two or three times, for about two hours, continually to belch, with ſuch a noiſe, that he might be heard far and near, at a great diſtance: But ſometimes for a week or two, and ſometimes

for

for a month, this belching would be changed into a long waking, for having that Diſtemper much remitted, this Gentleman was kept without ſleep almoſt whole nights; and when he had thus been for three days, and ſometimes more, perfectly waking, he ſeemed not to want ſleep, and complained not of ſleepineſs, dulneſs, or languor of ſpirits. And when *Narcoticks* rarely brought to him any help, he took ſometimes in the evening a Poſſet made of Ale and Canary Wine; and night coming on, he ſometimes drunk Diſtilled Waters, by the uſe of which, oftentimes he got ſome ſleep; then afterwards, his waking perfectly vaniſhing by degrees, his belching returned: Hence it appears, there was but one cauſe for either, to wit, the aduſt particles, and irritative, being poured forth from the bloody Maſs, ſometimes into the coats of the Ventricle, and ſometimes into the Cortical part of the Brain.

Secondly, beſides theſe diſtinct Diſtempers of Sleep and Waking, or their inordinations, there remain other conjunct, or complicated irregularities of them, in which, the acts of either function are prevaricated together. Which indeed is obſervable in that Diſtemper or affection called the Waking *Coma*; of which we ſhall now ſpeak briefly.

A deſcription of the waking Coma.

Thoſe ſick with the Waking *Coma*, although they are continually prone to Sleep, yet they can ſcarce ſleep at all, but after the manner of *Tantalus*, up to the chin in the *Lethæan* River, to taſt which as ſoon as he ſtoops down, the water ſlides away from him and ſinks lower. For they feel a cruel heavineſs in their Heads, with a ſleepineſs or numneſs of all their ſenſes, and faculties, that they hardly endure to turn themſelves in their Bed, or to be diſturbed by the by-ſtanders with talking, and expect they ſhall preſently fall into a ſweet ſleep; but when they would indulge it, and endeavour ſtrongly to embrace it, various phantaſms rolling about in their mind, keep them ſtill waking; neither are they ſuffered to take any ſleep at all, which ſeems to them to be ſtill at hand. Upon this, not ſeldom follows a *Delirium*, that whilſt the ſick lye with their eyes ſhut, they perpetually talk abſurd and ſenſeleſs things, and fling about hither and thither their Arms and Legs exceſſively, and being raiſed up, they look about them doggedly. It is an uſual thing for thoſe ſick of Feavours, to remain a whole night as it were drowned in ſleep; and in the mean time are ſcarce ſilent a minute of an hour, but murmur various things to themſelves; alſo ſometimes cry out, houl, and leap out of Bed. If the reaſon of theſe be inquired after, we may ſay, that the Pores and paſſages in the Brain, which are the walking places of the Spirits, are very much poſſeſſed with a thick and ſoporiferous matter, poured forth from the Maſs of the Blood, that the Spirits being very much hindred from their wonted expanſion, and mutual commerce, an heavy and invincible ſleep ſeems to hang over them; but becauſe ſome ſharp and highly active particles, like ſo many goads, cleave to theſe Spirits, they are perpetually incited into motion; and ſo ſome of them break thorow the ways, howſoever faſt ſhut and ſtopped with mounds, and run forth either directly or obliquely as they can; and thus ſuch motions of theirs, however confuſed and diverted, by reaſon of impediments, and not able to exerciſe compleatly the Animal function, yet they eaſily drive away or hinder its ceſſation and reſt; for this reaſon indeed, ſuch who are diſtemper'd with this Diſeaſe, are like thoſe living under the Pole, who only ſee (when the Sun is in the *Equinox*) the light on the *Horizon*, and have neither perfect night, nor perfect day; ſo theſe only enjoy a kind of twilight betwixt ſleep and waking.

The cauſe of this Diſtemper ſhewn.

It is more often a ſymptom of other Diſtempers than a Diſeaſe of it ſelf.

The Waking *Coma* is rarely a Diſeaſe of it ſelf, but for the moſt part it is a *ſymptom* coming upon other Diſeaſes, as the Feavour, Phrenſie, Lethargy, and the like; wherefore it requires not a Curatory Method peculiarly, but there is only need, that to the Remedies preſcribed for the firſt or primary Diſeaſe, there ſhould be added other *Cephalicks*, which may diſpel theſe clouds and meteors of the Brain; or if both will not be expelled together, the ſame Medicine which cheriſhes the parts of the one, getting the better, will immediately overcome the other: ſo in the Waking *Somnolency*, it is convenient to procure either perfect ſleep, or perfect waking, and in this caſe I have often given *Narcoticks* with good ſucceſs.

CHAP.

CHAP. VI.

Of the Incubus, or Night-Mare.

The Seat of the Incubus is in the Cerebel.

THUS much concerning the morbid exorbitancies of irregular ſleep and waking; which are almoſt proper, and as it were of the region of the Brain, and affect not the *Cerebel* but rarely, and that ſecondarily and collaterally, as hath been ſhown. But there remains a diſtemper, commonly called the Night-Mare, in Latine the *Incubus*, which is both peculiar to this Region, and alſo ſeems in ſome meaſure analogical to the ſleepy diſeaſes; foraſmuch as its fits ariſe, for the moſt part from ſleep, by reaſon of the Animal Spirits being bound in the Cerebel or ſuppreſſed; their eclipſe or interruption (though ſhort) about the exerciſe of the vital function, is induced.

A Deſcription of it.

That the ſubject, nature, and cauſes of this Diſeaſe may be the better known, we ſhall firſt conſider its *Phænomena*, or the appearance of it. The fits of the *Incubus*, or Night-Mare, for the moſt part, and indeed only falling on one in ſleep, are uſed to be excited moſtly after the ſtomach is loaded with undigeſted meats, and lying on the back in Bed. They who labour with it, ſeem to feel the hurt chiefly in the Breaſt, and about the *Præcordia*, for reſpiration being ſuppreſſed, and very much hindred, they think that a certain weight lying heavily upon their Breaſt, doth oppreſs them, which weight mocks their imaginations with the Image of ſome ſpectre or other; and this, whilſt they think to ſhake off, or put away, by the moving of their Body or members, they are not able to ſtir themſelves any way: But after a long ſpace, and ſometimes till they are almoſt dead, they at laſt awake with a ſtrugling about their heart, and being more fully rouzed from ſleep, the imaginary weight ſuddenly vaniſhes, and the motive force of the body is reſtored, but for the moſt part a trembling of the heart remains, and frequently a ſwift and violent beating of the *Diaphragma*. Then the fit being over, the deception of the phantaſie, conceiving the horrid image of the *Incubus* or ſpectre, is perceived.

It moſt often proceeds from natural cauſes.

The common people ſuperſtitiouſly believe, that this paſſion is indeed cauſed by the Devil, and that the evil ſpirits lying on them, procures that weight and oppreſſion upon their heart. Though indeed we do grant, ſuch a thing may be, but we ſuppoſe that this *ſymptom* proceeds oftenеſt from mere natural cauſes; though what they are, and in what place the Morbific matter doth ſubſiſt, is not agreed on among Authors, nor indeed is it eaſily to be aſſigned.

The Seat of this is falſly placed in the Brain.

Becauſe the imagination is deceived, and the error being propagated further into the ſenſes themſelves, ſo impoſes on the ſight and feeling, that they believe they plainly ſee and feel a monſter of this or that ſhape or figure lying upon them; and for that the loco-motive faculty of the whole body is hindred, in the mean time; ſome have placed the ſeat of this Diſeaſe wholly in the Brain, and would have the oppreſſion of the breaſt to be merely phantaſtical: But although we grant the monſtrous ſhape of the *Incubus* (which is conceived) to be a mere dream; the Precordia to be truly affected, is apparent, and the motion of the Pulſe and breathing is ſuppreſſed or hindred; for that the heavy weight of the breaſt is plainly felt by moſt, in their waking, yea, and when thorowly freſh awaked, and when that is removed, the tremblings of the Heart and *Diaphragma*, and inordinate motions follow: whence it follows that theſe parts labour and ſuffer a real hurt.

The Præcordia truly labour.

The cauſe doth not ſtick partly in the Brain, and partly in the Breaſt.

Wherefore others, that they might the more eaſily unlooſe this knot, dividing the Morbific Cauſe, aſſign a portion of it to the Brain, and another to the Breaſt; for they ſay, that the motion of the Lungs are hindred, by a viſcous and very groſs humor impacted about them, and that doth excite as it were the oppreſſion of a bulk lying on them, with want of breathing; then Vapors being raiſed to the Head, do fill the principal Nerves, and ſo hinder the loco-motive force: which opinion (no more likely than the conceptions of thoſe troubled with the Night-Mare) deſerves not to be aſſented to; becauſe there are not any ſigns of this humor heaped up about the *Præcordia*, which appear before or after the fit, yea when this region is very much burthened, as in the *Phthiſis*, *Aſthma*, or Dropſie of the Breaſt, the *Incubus* does not therefore infeſt more frequently or more grievouſly: Further it appears not, how the matter heaped up in the *Præcordia*, ſhould be only troubleſome in ſleep, or by what paſſage or way, the Vapours from thence ſo ſuddenly inducing want of motion, ſhould be

be elevated to the Head Wherefore, the Reaſon or *Ætiology* of this Diſtemper, I think to be taken or judged of far otherwiſe.

Therefore this heavy weight or load lying on the breaſt, ſeems indeed to be left, becauſe the motion of the Heart, and the organs ſerving for breathing, is hindred; for from the motion of the heart ceaſing, or being hardly performed, the Blood in its boſoms, and in the breathing or *Pneumonick* Veſſels ſtatgnating, and being there very much ſtreightned, a ſenſe of as it were a weight opreſſes the region of the breaſt: which alſo ſeems therefore the more grievous, becauſe the Lungs, *Diaphragma*, and Muſcles of the *Thorax*, being hindred in their motions, and as it were bound together, at the ſame time with the heart, do labour with a great endeavour, to exerciſe or to put forth themſelves. But the moſt hard queſtion yet is, concerning the Cauſe, by reaſon of which the motion or action of the Præcordia is ſuppreſſed, or hindred. This ſeems impoſſible to be done by matter impacted in the organs themſelves, of which indeed, there muſt be a very great deal, to ſuffice for the hindrance of ſo many parts, and ſome ſigns of it at leaſt would appear ſomewhat out of the fit; wherefore, it ſeems that we may rather ſay, that the action of thoſe parts are hindred, becauſe the influx of the animal ſpirits are hindred or ſuppreſſed. This is frequently done in Convulſive Diſtempers, as we have elſewhere declared, and have clearly ſhewed by *Anatomical* Experiment, to wit, by tying the trunk of the Nerves of the eighth pair, in a living Dog: But in thoſe diſtemper'd by the *Incubus* or Night-Mare, the obſtruction of the Spirits, ſeems to be excited neither in the organs themſelves, nor in their Nerves; for ſuch a cauſe happening to thoſe awake as well as to thoſe ſleeping, doth not become preſently moveable, but is fixed and permanent.

The next cauſe of this is, the hindrance of the inflowing of the Spirits to the Præcordia.

This not in the Parts affected;

Nor in the Nerves themſelves:

Wherefore, we think the fit of the Night-Mare to be induced, for that in ſleeping, a certain incongruous matter is inſtilled into the Cerebel, together with the nervous Juice, which cauſing a certain torpor or benummedneſs in the firſt ſpring of the ſpirits, compells them immediately, by little and little, to ceaſe from the offices of their functions; ſo that as it were another Lethargy being excited within the Cerebel, the vital actions ſuffer a ſhort eclipſe; during which, partly from a ſtrife of the obſtructed or bound together *Præcordia*, and partly from the blood very much heaped up and ſtagnating in them, that weight, or a ſenſe as it were of a great bulk lying on them, is cauſed; then, becauſe all the reſt of the faculties depend upon the motion of the heart, therefore this being ſuppreſſed and hindred, preſently thoſe eclipſes or diſorders of them follow; but eſpecially becauſe the flowing of the Blood into the Brain, for the making of Animal Spirits, is interrupted, therefore immediately the flowing forth of theſe into the nervous *Syſtem* is ſuppreſſed, ſo that the ſick, whilſt they endeavour to ſhake off the imaginary load of the breaſt, are not able to move their Body, or any member; to wit, becauſe the irradiation of the Spirits, (whilſt they are deſtitute of the flowing in of the Blood) is kept from the moving parts: In the mean time, thoſe which reſide in the Brain, being ſpread abroad here and there, conceive confuſed phantaſms, and from the trouble impreſſed from the *Præcordia*, horrid dreams of ſpectres.

But happens in the Cerebel, where the firſt Spring of the Spirits is.

From whence the ſenſe of the Weight proceeds.

Whence loſs of motion proceeds.

The fit of the *Incubus* is ſoon ended, becauſe the matter, rarely or never entring deeply into the Cerebel, is eaſily ſhaken off, or is ſupt back again into the Blood: for after the ſpirits became free from its embrace, and having got the liberty of motion within their wonted ſpaces, they repeat the exerciſes of their functions: wherefore, the afflux of the Blood then preſently returning to the Brain, immediately the afflux or flowing forth, and emanation of the Spirits, are reſtored, like a light new kindled, both in its middle or marrowy part, and alſo in the nervous Stock: whence they being awakened, the motive force returns, and the error of the imagination is perceived. But that there follow in the Heart and *Diaphragma* tremblings and moſt ſwift beatings, the reaſon is, becauſe theſe Bodies, ſo long as they were hindred from their motions labouring with an endeavour of exerciſing, or putting forth themſelves, are not able to contain themſelves within their juſt limits, as ſoon as they are reſtored, but putting forth at once all their ſtrength, and being too active, exceed the due performance of their duty: even as a wand, being held a while bent, being afterwards let go, recovering it ſelf with a certain force, enters into a motion of trembling or ſhaking.

Wherefore the fit being ſo grievous, is ſo ſoon ended, without leaving any evil.

Whence after the Fit, the tremblings of the Heart and the Præcordia.

After this manner, the fit of the Night-Mare, becauſe it immediately ſtops the vital function, as it were the firſt moving wheel in the animal Machine, compels forthwith all the other faculties to ceaſe, yea the whole corporeal ſoul (more than the more grievous fits of the *Apoplexy* or the *Lethargy*) to ſhake, and as it were to ſuffer an eclipſe. Notwithſtanding, little danger is threatned from this Diſtemper, becauſe the Morbific matter being poured forth from the Blood, into the compaſs of the Cerebel,

The Incubus of it ſelf rarely dangerous.

Cerebel, is not ſuffer'd to penetrate deeply; becauſe the Spirits of that province, being always in a readineſs and watchful, moſt ſwiftly run to meet the enemy, and oppoſe his entrance ſtrongly, though the offices of the vital function be omitted in the mean time; further, the Animal Spirits which are in the region of the Brain, being awakened, fly preſently to aſſiſt thoſe of the labouring Cerebel: For thoſe ſick of the *Incubus*, if by chance they be awakened by any one lying with them, they ſooner come out of the fit.

The Prognoſtick of the Incubus.

But although it is rare, that any one dyes of this Diſeaſe only; yet thoſe often obnoxious to it, if they are taken with other *Cephalick* Diſtempers, as the *Lethargy*, *Carus*, *Apoplexy*, or the *Epilepſie*, are in far greater danger: becauſe the Morbific matter, being poured forth from the Blood into the Brain, eaſily invades the Cerebel ſo prediſpoſed; ſo that the ſick therefore ſuffering at once an eclipſe of the vital and the animal function, are brought into greater danger of their Life. Hence 'tis a vulgar obſervation, that thoſe who frequently are troubled with the *Night-Mare*, fall into the *Apoplexy*.

The Event of it is ſhewn.

There is wont to be another event of the *Incubus*, leſs dangerous, that leads often into the *Cardiack* paſſion, and other affections, commonly taken to be *Hypochondriack*. I knew ſeveral while young, grievouſly afflicted with the *Night-Mare*, who being freed from it in their riper Age, were troubled with the trembling and palpitation of the Heart, and other pains about the *Præcordia*, and *Hypochondria*; and alſo with Convulſions in thoſe parts. We think the cauſe of this morbid commutation to be, becauſe the Morbific matter, after it was wont ſo often to beſiege the region of the Cerebel, at length an impreſſion being made, it did penetrate more deeply into ſome private place, and paſſing thorow its frame, became impacted on the Nerves deſtinated to the *Præcordia*.

Its Cure.

As to the Cure of this Diſeaſe, there needs no help for the fits, becauſe they paſs away quickly of themſelves. The method of Cure after a conſidering the whole, ſuggeſts Blood-letting, (where it is convenient) and a gentle Purge, and chiefly the uſe of Remedies, which are commonly called *Cephalicks*. Therefore, here Powders of *Amber*, *Coral*, and *Pearls*, with the Roots of the *Male Pœony*, *Cretick Dittany*, *Contrayerva*; alſo *Electuaries*, *Tablets*, and *Diſtilled Waters*, *Tinctures*, *Elixirs*, and other things that are wont to be preſcribed in the *Lethargy* and *Apoplexy*, have the chief place; but eſpecially a right courſe of dyet being ordered, let groſs and ill digeſted meats be ſhunned, Pulſe and Summer-fruits; nor let ſleep, ſtudy, or reading be preſently yielded to after eating: late and large Suppers, and lying on the back, are to be forbidden.

Infants and Boys obnoxious to this Diſeaſe, how they ought to be handled.

Becauſe Children and Youths, are often ſick of this Diſeaſe (the ſign of which is, that they are ſhaken in their ſleeping, and waking cruelly cry out) and more often ſuffer its fits, which oftentimes bring them to Convulſive paſſions, therefore a method of healing them ought to be adminiſtered, as ſoon as they are ſeen to be diſtemper'd: you ought to inquire into the milk they ſuck, whether it be of it ſelf pure and laudable, and truly convenient for the Stomach: let them not ſleep preſently after they have ſucked their fill: The Nurſe uſing a good dyet, let her take alſo Morning and Evening a Doſe of *Cephalick* Powder, or *Electuary*, drinking after it a draught of Poſſet drink, with the leaves of Sage or Betony, or the Roots or Seeds of *Pœony* boiled in it: Let the Infant take twice a day, a ſpoonful of proper Diſtilled Water. Let him have an Iſſue made in the nape of the Neck, and let it lye ſometimes on one ſide, and ſometimes on the other, and rarely or never on its back. If a Neck-lace of Coral, or little balls of the Seeds or Roots of the *male Pœony* be worn about the Neck, or at the pit of the Stomach, it is not altogether uſeleſs; if that in ſleep being often and grievouſly ſhaken, they are ſeen to be more dangerouſly troubled with this Diſtemper, let Bliſters be raiſed in the hinder part of the Neck, or behind the Ears; alſo Evening and Morning let there be daily given a Doſe of the Powder of *Ammoniacum*, or other proper Doſe, in a ſpoonful of Diſtilled Water or *Julep*.

CHAP.

CHAP. VII.

Of the Vertigo, or a turning round in the Head.

The Seat of the Vertigo.

HAving viewed the exterior compaſs of either part of the Head, and detected the Diſeaſes which beſet the ſenſitive ſoul, about the firſt beginnings, and laſt ſprings of the Animal Spirits; we ſhall next deſcend to the middle part of the Brain, where the phantaſie and common ſenſe reſide, and behold what kind of paſſions theſe parts are obnoxious to. Concerning this in the firſt place we ſhall note, that ſometimes troops or rather mighty armies of Spirits, inhabiting theſe places, are affected, and ſometimes alſo ſmall handfuls or bands: then again many of them are affected together, or elſe only a few at a time; or they become Elaſtick from an heterogeneous *Copula*, and ſo are compelled into inordinate motions, or as it were exploſive or ſhooting off, as in the *Epileptick* fit; or ſuffering an *eclipſe*, as in the *Apoplexy*, are deprived of all motion. Concerning the former diſpoſition of the Spirits, we have formerly treated largely enough, and the aſtoniſhing Diſeaſe we ſhall handle afterwards. But in this place, we ſhall ſpeak of a certain Paſſion or diſtemper belonging to theſe parts, *viz.* the *Vertigo*, in which a certain band or handful of the Spirits are affected, and their motions are ſeen to be partly perverted, and partly ſuppreſſed.

A Deſcription of it.

Being but little ſolicitous about the names by which the *Vertigo* is wont to be known, we ſhall deſcribe the nature, or formal reaſon of it after this manner, *viz.* "The "*Vertigo* is an Affection or Diſtemper, in which the viſible objects ſeem to turn "round, and the ſick feel a perturbation, or confuſion of the Animal Spirits in the "Brain that they do not rightly flow into the Nerves: Wherefore the viſive, and "the loco-motive faculties, do often in ſome meaſure fail, that thoſe labouring with "it fall, and oftentimes are covered with darkneſs.

In this fit it is obſerved, that the imagination and the common ſenſe are in a manner deceived, whilſt they believe, the quiet objects to be moved, but the rational judgment remains; for we underſtand our error, and we preſently aſcribe this fallacy to the inordination of the Animal Spirits; for that we plainly know that the ſpirits flowing within the Brain do decline from their wonted irradiation or beaming forth, and do not rightly perform the offices of motion and ſenſation, during the fit.

The Cauſes and the Manner of the non-natural Vertigo.

That we may find out the Morbific Cauſe, and the preternatural manner of the *Vertigo*, we ſhall inquire after what manner this ſame affection or Diſtemper, how extempory or ſudden ſoever it be, is wont to be excited from non-natural things; for men ordinarily become Vertiginous (or have a turning in their head) with a long turning round of the body, looking down from an high place, paſſing over Bridges, Sailing, and by Drunkenneſs, and many other ways. It will be worth our while to conſider a little further, the means of affecting, by which theſe exterior actions ſtir up this turning or rolling about, from whence it will the better appear, what kind of intrinſick cauſes may be able to excite this paſſion. In the firſt place therefore, when men are for ſome time turned about, both in that motion all things ſeem to be turned about, and alſo they ceaſing from turning about, that ſtill continues in the phantaſie; ſo that the affected oftentimes fall to the ground; further, though they ſhut their eyes, they ſtill perceive as it were a turning round, like the turning about of a Mill, in the Brain.

The Reaſons of them ſhewn.

The reaſon of theſe is not, that the deception of the ſight is firſt brought to the eyes, and afterwards continued for ſome time; becauſe this affection is cauſed by the turning round of the body, whether they look with, or ſhut their eyes: But indeed the cauſe of this apparition wholly depends upon the fluid ſubſtance of the animal ſpirits. For that the ſpirits flowing within the Brain, are even like to water, or a thick heap of Vapors, included in a Phial, which being ſhaken round about, together with the Veſſel, and made ſo to turn about, continues for a time that motion, though the Veſſel ſtands ſtill; in like manner alſo, when the body of a man is turned round about, the ſpirits inhabiting the Brain, from that turning about of the Head, like the containing Veſſel, are agitated into ſpiral or round motions; and when therefore they cannot irradiate the Nerves with their wonted influx and direct beams, from hence oftentimes a *Scotomy* or dizzneſs, and a failing of the feet, together with a rotation or whirling about of viſible objects, are induced. The viſible Hemiſphere ſeems to turn round, becauſe as the ſenſible impreſ-

ſion is received by the means of the recipient, ſo the objects, as the ſpirits, ſeem to be moved round about.

Why looking down from on high, and paſſing over Bridges, cauſe a turning round in the Head.

Secondly, looking from on high, and paſſing over Bridges, ſtir up a *Vertigo* or giddineſs in the Head, for that there is a terror caſt on the imagination from unaccuſtomed objects, as alſo from the ſite of the body, or going in danger, whence that being very ſolicitous, how it ſhould rightly order and more firmly direct the ſpirits into the bodies of the Nerves, calls them back into the middle part of the Brain, and ſo perverts them from their wonted afflux and irradiation; and whilſt it indeavours to ſet their battel in better array, and to direct them more ſurely, by too great a care, drives them into a certain confuſion and irregular motion. Wherefore 'tis obſerved, that drunken men, and very bold, becauſe they are not careful or ſolicitous concerning the guiding of the animal ſpirits, ſuffer no ſuch thing. Sailing, or riding in a Coach, cauſes a turning in the Head by the like reaſon, as the turning round of the Body; becauſe, the very fluid ſpirits being too much agitated, like water ſhaken in a Glaſs, leap hither and thither diſorderly. Further, it is wholly for the ſame reaſon, why many going by Ship, or by Coach, are ſubject alſo to cruel Vomiting; to wit, becauſe the ſpirits being ſnatched into diſorder, by too great a motion, and confuſed fluctuation, run inordinately into the heads of the Nerves of the wandring pair, and for that reaſon ſtir up Convulſions and Convulſive motions in the Bowels.

How Drunkenneſs.

Thirdly, 'Tis obſerved, that the *Vertigo* comes upon Drunkenneſs, as a known *ſymptom*; and that to thoſe unaccuſtomed, the drinking, though moderately, of Wine or ſtrong Ale, alſo the taking of *Tabaco*, eaſily induces the ſame affection; the reaſon of which is, becauſe from the Liquor, or vapour ſo taken, certain fierce particles, and untameable, are carried into the Brain, by the paſſages of the Blood and nervous Juice; which being improportionate, and incongruous to the Animal Spirits, drive them hither and thither from their wonted tracks of flowing and reflowing or ebbing, and ſo move them into whirlings, and turnings about.

Theſe are the chief occaſions, or ſolitary evident cauſes, which do uſe to bring the *Vertigo*, or turning round in the Head to ſome men, how ſound of conſtitution ſoever they be: which kind of effect, theſe occaſions produce, foraſmuch as the Animal Spirits, being diſturbed beyond their ſet courſes, and orders, are moved inordinately, fluctuating here and there, both within the paſſages of the Brain, and alſo ſome of them, like a thred broken off, from their wonted irradiation, into the nervous Stock. For theſe being always reciprocal, depend mutually one of another, to wit, a perturbation of the Spirits within the middle part of the Brain, and their flowing forth into the nervous Stock being hindered; for from what ever cauſe either effect is induced, the other immediately follows. A turning round of the body, going in a Coach, or in a Boat or Ship, alſo Drunkenneſs, and the unaccuſtomed fume of *Tabaco*, compel the ſpirits in the Brain to fluctuate and ſhake diſorderly, which, for that cauſe, are preſently inhibited from their wonted flowing into the Nerves, that thoſe ſo affected, can hardly go or ſtand; in like manner, on the contrary, looking from on high, paſſing over Bridges, a languiſhment or *ſyncope* falling on them, recal the ſpirits from their wonted emanation, who, for that cauſe tumultuating within the Brain, or being moved inordinately, cauſe a *Scotomy* or dizzineſs, or a turning round of the objects.

A perturbation of the Spirits in the Brain, and a revocation of them from their flowing into the Nerves, depend mutually on one another.

From what cauſes the preternatural Vertigo is wont to be excited.

Theſe things being thus premiſed, concerning the *Vertigo*, raiſed up by reaſon of an outward accident, or from a ſolitary evident and non-natural cauſe; we ſhall next inquire, how and by what means, it is wont to be induced, from an intrinſick and preternatural cauſe.

Concerning theſe take notice, that the *Vertigo* is ſometimes a ſymptom depending upon ſome other Diſtemper, placed ſometimes within the Brain, and ſometimes without it: but ſometimes this is a Diſeaſe of it ſelf, which being raiſed up within the middle part of the Brain, becomes very troubleſome, and often terrible, and very hard to be Cured.

Sometimes the Vertigo is a ſymptom of other Cephalick Diſeaſes.

As to the former, many *Cephalick* Diſeaſes (or ſuch as belong to the Head) *viz.* Acute pain, the *Lethargy*, *Epilepſie*, *Carus*, *Apoplexy*, with many others, do often accompany the *Vertigo*; to wit, becauſe the equal expanſion of the Spirits in the Brain, and therefore their irradiation into the nervous Stock, from ſuch like various Morbific cauſes, are eaſily hindred or diſturbed; as ſhall hereafter appear, when we deliver the *Aetiology* or reaſon of the *Vertigo*, as it is a Diſeaſe of the Brain.

Sometimes it is excited by reaſon of the Diſtemper of other

But ſometimes this *ſymptom* is wont to be produced, by reaſon of other Diſtempers, placed a long way from the Brain, and that chiefly by two ways or means. For firſt it is uſual for a dizzineſs to ariſe, by reaſon of the flowing of the Blood being ſud-

denly

denly called away from the Brain, as in a *Syncope* or Swooning, great want coming near it, wicked hard labour great *Hæmorrhagies* or expence of blood, long fasting, in passions of violent sadness and fear; yea by reason of other occasions, when the motion of the blood is deficient or fails in the heart; so that the affected are proclive to faintings and swooning away; presently, because the tribute of the vital liquor is withdrawn, the animal Spirits growing deficient in the Brain, withdraw their radiation from the nervous Stock; for when their spring is cut off, those that remain, leaping back from their emanation, wander about confusedly in the Brain, and very often stir up the Vertiginous Distemper.

distant parts, viz. from the stomach, spleen, &c. and so by two means:
1. Either by reason of the Flood of the Blood being kept back.

Secondly, an inordinate recourse or flowing back of the Animal Spirits, from some inward, or from some outward member, often causes the *Vertigo*: forasmuch as the Spirits being disturbed from the affected part, by a long series, thorow the passages of the Nerves, at length disturb others inhabiting the middle part of the Brain, and drive them into the like disorders; for this cause it is, that sharp humors gnawing or pulling the Fibres of the Ventricle, because the infestous and irritative matter being moved in the Spleen, *Pancreas*, or Intestines, causes light dizzinesses in the Brain. I have known from an accute pain, an Ulcer, or a mortified Inflammation in the Foot or Arm, frequent tremblings and failings, though short, in the Brain, to have been induced. Whilst that the conceived inordination of the spirits, is transferred from the distemper'd part, thorow the Nerves into the Brain, a certain Formication or tingling, or as it were the ascent of a cold air, is seen and perceived; wherefore the cause of this Distemper is commonly ascribed to Vapours, arising up to the Head: which error we have elsewhere sufficiently confuted. Further, many are wont, when they have fasted, or stayed long beyond their hour of dineing, to have a dimness before their eyes, and their heads to have a turning, and then afterwards those clouds vanish, having eaten a little; this does not so happen (according to the vogue of the people) for that wind or vapours ascend to the Head, from the empty Stomach, which the aliments being taken in, do immediately suppress; but because the Fibres of the Ventricle, and the nervous Filaments or little strings, being destitute of the nervous Juice, with which they desire to be watered, are wont to enter into corrugations or wrinklings, and light Convulsions, which kind of Convulsions and disorders of Spirits, for that they are continued thorow the passages of the Nerves, into the Brain, produce the Vertiginous Distemper; which, as soon as the Fibres of the Stomach remit their wrinklings, ceases of its own accord. For this reason I have known some, by a Vomit being given, tearing the coats of the Ventricle, to have been taken with a cruel *Vertigo*: yea I do suspect, that this Distemper does sometimes arise from meats of ill digestion, and ungrateful to the stomach.

2. Or by reason of an inordinate recourse, or flowing back of the Spirits towards the Brain.

Not by reason of vapours, elevated from these parts is it excited.

But the *Vertigo* is not only a *symptom*, but sometimes a primary Disease of it self; whose nature, that we may the better search into, we ought to inquire into its subject, the formal reasons, and causes of it; and then these being found out, and truly unfolded, we will proceed to its prognostick and Cure.

Without doubt the immediate subject of the *Vertigo* are the Animal Spirits, which every one labouring with this Disease finds to be greatly disturbed, and wandring up and down; but the mediate subject are those parts of the Brain, in which the Imagination and common sense reside, and whence the next way lies into the nervous Stock. These are the Callous and streaked bodies.

The immediate Subject of the Vertigo is the Animal Spirits.

For indeed, the Animal Spirits love to expatiate themselves, and to he expanded or stretched forth on every side, within these medullary places, as in a most ample Field, and pleasant Garden; wherefore like beams of light, with a full and streight ray, they pass thorow all the Pores and most thick passages of the marrow: hence it is, that whilst they gently flow in one line, from the outmost border of the Callous body (to wit, from the streaked bodies, and turnings and windings of the Brain) towards its middle part, they represent pleasant imaginations and phantasies; and whilst in another line they flow forth, perhaps thorow other passages from the middle of the Callous body, into the infoldings or windings about of the Brain, they transferr thither signets or marks of notions for the Memory; and then, whilst they tend into the streaked bodies, and the beginnings of the Nerves, they actuate all the moving parts, and carry to them, as often as there is occasion, the instincts of the motions they are to perform.

The mediate the Callous Body.

But in the *Vertigo*, these equal emanations of the Spirits, as it were rays of light, seem to be intercepted, and diversly perverted in various places; because some bands or handfuls of the Spirits are obscured, others are bended another way, and moved hither and thither into turnings round and whirling about, and oftentimes snatched transverse, or cross one another. Wherefore, confused phantasms, wandring and inconstant

Its formal reason.

ſtant images, or actions of ſenſible things are repreſented, in the Brain, by reaſon of the Spirits ſo diſturbed: Then foraſmuch as the irradiation into the nervous ſtock is leſſened or hindred, a dizzineſs and failing of the motive function follows.

If that we ſhould yet further inquire into what hinders or obſtructs the ways, whereby the Spirits are compelled thus to go aſide, or tumultuate within the Brain; it ſeems probable, that theſe inordinations of theirs do depend upon a two fold cauſe, *viz.* firſt, that certain fierce and extraneous Particles, being entred deeply into the Brain, together with the nervous Juice, ſtick cloſe to the ſpirits, and move them into enormous motions; but this, as appears from common experience, happens to every one, on the immoderate drinking of Wine or Strong-waters, or the unaccuſtomed taking of *Tobacco*, by the eating of ſome Vegetables, or being anointed with *Mercury*; for that ſome Heterogeneous bodies and infeſtous to the Spirits, follow them, and are ſnatched with them, even to the middle part of the Brain: why may not ſuch kind of Morbific particles and Vertiginous be ſupplied from the Blood, and other humors very much vitiated, and inſinuated into the inmoſt conclave of the Brain? Then ſecondly, we may ſuſpect, that when the ſerous foulneſs doth by degrees creep forward with the nervous Juice, and at length penetrated deeply, that it doth contaminate theſe pure marrows, and greatly ſtuff up its Pores, ſo that the Animal Spirits do not ſhine or beam forth with a clear and full light, but with a weak, broken, and as it were with many ſhadows mingled or interſperſed with it.

Its Conjunct Cauſe.

1. From the perturbation of the Spirits.

2. From their ways or paſſages being obſtructed.

In an habitual *Vertigo*, and inveterate, it ſeems to be plain, that the Conjunct Cauſe doth contain both theſe, from the proof, and that not light, taken from things that are hurtful and helpful: For I have obſerved in many, that this affection or Diſtemper hath been altered, much for the worſe or for the better, upon two occaſions; for whatſoever things being inwardly taken, that beget turgid particles, and apt to grow too hot and rageing, as Wine, Strong-waters, ſpiced, pepper'd, and flatulous or windy food, always hurt thoſe troubled with the *Vertigo*: and for the ſame occaſions, no leſs hurtful are thoſe things, by which the brain is filled, and more ſtuffed, as Surfeits, ſleeping at Noon, or overlong in the Morning, the Southern wind, a cloudy, thick, and moiſt air, a low and watry habitation; on the contrary, the ſame perſons are much helped, as they eaſily perceive, by a ſlender and light dyet, alſo by a clear air, and an open ſoil, where the wind has a thorow paſſage.

This is ſeen by things helpful and hurtful.

Thus much concerning the ſubject, the formal reaſon, and the conjunct cauſe of the *Vertigo*; now in the next place, let us inquire into its *Procatartick*, or more remote leading cauſe; by reaſon of whoſe morbid proviſion or prediſpoſition, theſe two evils are wont to be induced on the ſpirits inhabiting the middle part of the Brain: But here we apprehend both the Brain it ſelf, with the watering Liquor, and alſo the Blood with its infected humors to be in fault.

The more remote foregoing cauſe of the Vertigo *conſiſts both in the vice of the Blood, and of the Brain.*

The vice of this is moſt often, that it turns from its right temper, into a ſour, acid, and otherways vicious diſpoſition, and being degenerate, perverts the nouriſhing Juice; and alſo gathers in its boſom a Serum, and filthineſs of diverſe kinds, which it is ready to pour forth into the Head. But there are many evident cauſes, to wit, an evil dyet, and errors in the non-naturals, alſo the Scurvy, a long or malignant Feavour, and other Diſeaſes going before, by reaſon of which the Blood becomes ſo full of ill humors, and ſo hurtful to the Head.

The Reaſon of the former explained.

In the mean time, the crime of the Brain is, for that its temper is humid and weak, its frame looſe and infirm, with its Pores too much open and gapeing, more than they ought, ſo that all the heterogeneous, ſtrange, and elaſtick Particles, together with the ſerous, or otherways diſeaſed recrements, being poured forth from the Blood into the Head, are eaſily admitted into the Brain, together with the nervous Juice; and becauſe of its more open Pores, fall down without any let or ſtop into the middle part, *viz.* the Callous and ſtreaked Bodies. This kind of too diſſolute or looſe habit of the brain, is in ſome innate and originally; further, thoſe who are of a tender conſtitution, to wit, delicate, ſoft, and luxurious Men and Women, whoſe ſpirits are not able to ſuffer any thing ſtrongly, eaſily contract a Vertiginous Diſtemper, or rather increaſe it; to wit, becauſe when the ſpirits of the Brain cannot reſiſt the incurſions of ſtrangers, they give way to every matter that is drove to them: but in others, though ſtrong, inordinate feeding, a ſedentary life, frequent ſurfeiting, alſo intemperate ſleep, and ſtudy, an inveterate Scurvey, evil groſs humors, a long Feavour, and other diſeaſes of the Head, do very often cauſe this kind of evil diſpoſition of the Brain.

The vices of the Brain noted.

From what hath been ſaid, the differences of this Diſeaſe are eaſily gathered; for that I may paſs by what we but now mentioned, that it was either a primary Di-

The differences of this Diſeaſe.

ſtemper

ſtemper of it ſelf, or ſecondary ariſing or depending upon others: further we noted, that the primary *Vertigo*, ſo it were light and not deeply rooted, was only troubleſome with fits excited from an evident cauſe; ſo that oftentimes the diſtemper'd are well enough, but by reaſon of their evil manner of living, or other accidents they become *Vertiginous*; but ſometimes this Diſtemper becoming habitual, they are found to be obnoxious to it almoſt at all times. Secondly, As to the ſeat of this Diſeaſe there is a notable difference; for this is ſometimes more outward as is ſeen happening in the Callous body, and hath almoſt only the tumults and failings of the Spirits, and the wandring, inconſtant, and often confuſed acts of notions and ſenſe, in the forepart of the Head; but ſometimes the Morbific matter falling down more backward, about the ſtreaked bodies, ſtirs up the *Scotomy*, or turning of the Head, and a loſs or failing of the motive function, that oftentimes the Eyes are darkened, and they reel or ſtumble, and their Legs fail them.

As to the *prognoſtick* of this Diſeaſe, the *ſymptomatick* or accidental *Vertigo*, yea almoſt all the others, while freſh, are free from much danger, and are eaſily to be Cured. *Its Prognoſtick.*

But the habitual, and almoſt continual, although great danger and ſuddenly to fall is rarely threatned; yet becauſe it admits of only a difficult and long Cure, it ſo tires out both the Patient and the Phyſician, that before the Diſeaſe can be Cured, they both become weary of one another.

The primary *Vertigo* being placed before, or more outward, which hath ſcarce a darkneſs or falling accompanying it, is more ſafe, and healable, but is often changed into an inveterate Headach, and ſometimes alſo it is cured of it ſelf, by an *Hæmorrhage*, or bleeding at the noſe, or by a flowing down of the *Hæmorrhoids*; it is alſo oftentimes taken away by Medicine.

The *Vertiginous* Diſtemper, ariſing behind, and intercepting the beamings forth of the Spirits into the Nerves, is far more dangerous, and oftentimes paſſes into an *Apoplexy*, or a *Palſie*, or into Convulſive Diſeaſes.

There does not properly belong to the *ſymptomatick Vertigo* any Curatory Method. There it is only needful to joyn ſome *Cephalick* Remedies, diſcuſſing the clouds of the Brain, and quieting the diſorders of the Spirits, to thoſe other primary indications; or rather that we may ſpeak to the capacity of the vulgar (which ought to be done ſometimes, though feignedly) let ſome Medicines contrary to Vapors be added. *The Cure of the* Vertigo.

The accidental *Vertigo*, or any other freſh or newly taken, may be healed with *Phlebotomy*, and a gentle Purge, and ſometimes iterated; but that the Diſeaſe may be more certainly extirpated, let there be beſides adminiſter'd carefully *Cephalick* Remedies, ſuch as are anon deſcribed.

For the Cure of an habitual *Vertigo*, and become inveterate, there ought to be inſtituted almoſt the like method, as is againſt moſt other *Cephalick* Diſeaſes, which ſuggeſts theſe three chief intentions of healing, *viz.* in the firſt place muſt be endeavoured that the root or neſt of the Diſeaſe may be cut off, and that the brain may remain free from any new flowings in of the Morbific matter; for which end a right order of dyet being commanded, ſometimes letting of blood, and moſt often a gentle Purge in the intervals are convenient. Let a dry and open air be choſen, let immoderate and untimely ſleep and ſtudy be ſhunned, let morning and evening draughts be wholly abſtained from; in the place of the former, let a draught of *Tea* or *Coffee*, with Sage leaves boiled in it, be given. Let an Iſſue be made in the Leg or Arm, and ſometimes let the *Hemorrhoidal* Veſſels be kept open with Leeches; let the diſtemper'd riſe early in the morning, and waſh every day the fore-part of his Head with water, and alſo his Temples, and rub them with a courſe cloth. *There are three chief intentions of healing;* *1. To take away the root or feeding of the Diſeaſe.*

Secondly, The ſecond curatory intention is, to take away the *Procatartick* or more remote foregoing cauſes; wherefore, endeavour that both the *Dyſcraſie* or evil diſpoſition of the Blood may be removed, and alſo that the weak and too looſe conſtitution of the Brain may be mended: For the former, altering remedies chiefly are convenient, as temperate *Antiſcorbuticks*, and ſometimes *Spaw* Waters, or Whey. To which always may be added for the latter indication, *Cephalick* Medicines, to wit, ſuch as are prepared of Coral, Amber, humane Skull, the root of the *male Pœony*, Miſſeto, the dung of a Peacock, and the like, the forms of which we ſhall ſhew you by and by. *2. To remove the procatartick cauſes.*

The third Intention, which is properly curatory, endeavours to take away the Conjunct Cauſe of this Diſeaſe; which however the Procatartick Cauſes being removed, for the moſt part ceaſes of it ſelf: for if the coming of every extraneous Matter into the Brain be cut off, there will remain nothing but pure and clear Spirits, and they having gotten open and free ſpaces, within the Callous Body, will from thence *3. To take away the Conjunct Cauſe.*

thence flow forth on every ſide: However, for the ſcope of healing this, you muſt proſecute it with the former; with Medicines indued with a volatile ſalt, whoſe particles being very ſubtil and active, do refreſh the Animal Spirits, of which ſort are chiefly Spirits of Harts-Horn, Sut, of *Sal Armoniack*, *&c.* impregnated with Amber, and humane Skull, Tinctures of Coral, Amber, Antimony, Elixir of *Pœony*, *&c.*

The Curatory Method is ſhewn.

Theſe things being premiſed, concerning the *Vertigo* in general, it will ſeem to the purpoſe, to draw or ſhadow forth the Curatory Method particularly, and as it were to direct you by a thred: and in the firſt place is ſhewn what is to be done for the Cure in the fit, and what out of it, for prevention.

1. As to the firſt, although the invaſion of the *Vertigo* ſeem cruel, it is for the moſt part without danger, and eaſily paſſes over of its own accord; In ſuch a caſe, if the Pulſe ſhews it, let Phlebotomy be made uſe of, after having given a Glyſter; but becauſe the ſick think themſelves dying, and expect medicinal help, in that caſe let there be Bliſters made in the Neck, and ſtinking things held to the Noſe, as *Caſtor*, the Spirits or Salt of Harts-horn, or Urine, or of *Sal Armoniack*. Further, let theſe Spirits be given twice or thrice a day with a convenient Doſe of *Cephalick Julep*: going to ſleep, let them take a *Bolus* of *Mithridate*, with the Powder of *Caſtor*: let them take the next day, if the Diſtemper doth not yet vaniſh, a light Purge, or if the ſick be prone or eaſie to Vomit, an *Emetick*, than which a better Remedy can ſcarce be taken.

Take *Pills of Amber twenty five grains, of the Reſine of Jalap ſix grains, of Tartar Vitriolated ſeven grains, of the Balſom of Peru what will ſuffice to make four Pills, to be taken going to bed, or early in the morning.*

Or Take *of the Sulphur of Antimony five grains, of the Cream of Tartar half a ſcruple, of Caſtor ſeven grains; make a Powder: Let it be taken with care, expecting to Vomit.*

Why vomiting Medicines are ſo much noted in this, and other Diſeaſes of the Head.

That Vomiting Medicines do oftenеſt help in the *Vertigo*, beſides the teſtimony of Authors, appears plain enough alſo from common obſervation; and beſides, ſince thoſe troubled with the *Vertigo* do often Vomit of their own accord, many have been of the opinion, that the cauſe of this Diſeaſe moſt commonly lyes hid in the ſtomach; but it is much otherways, and as we have elſewhere ſhewed; Vomiting frequently follows upon the Spirits being diſturbed in the Brain: But that Vomits help much in this Diſeaſe, the reaſon is, becauſe this kind of Phyſick cauſes a great revulſion of the humors from the Brain, and very much reſtrains the Spirits tumultuating in it. When the Membranes and Fibres of the Ventricle, and Viſcera planted nigh them, are pulled; various humors, *viz.* the *nervous*, *ſerous*, *watery*, *pancratick*, and *cholerick* are drawn into thoſe parts, and ſo ſqueeſed forth, ſo that the Head being freed from their flowing to it, doth eaſily ſhake off from it many impacted there before: then as to the Animal Spirits, we have ſhewed ſomewhere, that there is a moſt intimate commerce, and agreement between thoſe inhabiting the ſtomach, and thoſe dwelling in the Brain; to wit, that therefore the grateful or ingrateful affection of the Ventricle, from things taken into it, might bring rejoycing or dejection to the Spirits dwelling in the Brain. *Opiates* whilſt they lye in the ſtomach cauſe ſleep; in like manner, it doth not a little help in the *Vertigo*, and other *Cephalick* Diſeaſes, whereby the Spirits of the Brain wandring up and down, and agitated enormouſly may be repreſſed, and returned into order; if their Companions or Kindred be ſtriken down, by the working of the Medicine; becauſe whilſt many are called forth from the Brain, to their aſſiſtance; the others remaining, remitting their diſorders, reſume their wonted offices or functions: without doubt it is for this reaſon chiefly, *Emeticks* bring ſo often help in the Diſtemper of madneſs; ſo that *Empericks* do almoſt only uſe them.

What is to be done out of the Fit, for prevention ſake.

2. But to return from our digreſſion, let us conſider what is to be done for the Curing of an inveterate and almoſt continual *Vertigo*, out of the fit. Therefore, firſt a method being inſtituted concerning bleeding, and purging, according to the conſtitution and ſtrength of the Patient, and after reſt, to be repeated; let a Vomit alſo, by my advice, be taken once a month (if nothing to the contrary hinders it) for which end let there be given to the weaker, after the ſtomach is filled with ſlippery Meats, Wine, and *Oxymel* of Squils, to about two or three ounces, and after it let a great quantity of Poſſet-drink be drunk, with *Carduus* boiled in it, that the Patient may vomit of himſelf, or by provocation. To others may be given an Emetick of the Salt of *Vitriol*, or the Sulphur of *Antimony*, or of the infuſion of *Crocus Metallorum*:

lorum: as concerning Iſſues, Bliſterings, the bleeding at the *Hemorrhoidal* Veins, Plaſters, or quilted Caps to be worn upon the Head, or other Topicks to be applied to the ſoals of the Feet, or to the wriſts, for revulſion or derivation ſake, let the Phyſician deliberate.

Take *of the Conſerve of the Flowers of the male Pœony ſix ounces, of the Powder of its Root one ounce, of the Seeds of Pœony powder'd two drams, of Amber, Coral, Pearls powder'd, of each two drams and a half; of the Salt of Coral one dram, of the Syrup of Coral, what will ſuffice to make an Electuary: the Doſe is one dram and an half, or two drams, Evening and Morning; drinking after it of the following diſtilled water three ounces.* *Electuary.*

Take *of the freſh leaves of Miſleto ſix handfuls, of the root of the male Pœony, and of Angellico, each one pound and an half; of the whiteſt dung of the Peacock two pound, of Cardamoms bruiſed two ounces, of Caſtor three drams; all being cut ſmall and mixt together, pour to them eight pints either of White Wine, or Whey, made of it: Let them be diſtilled in fit Stills, and the whole liquor mixed together.* *A diſtilled Water.*

Take *of the Powder of the Root of the male Pœony half an ounce, of red Coral prepared, of Species Diambræ, each one dram and a half; of the Powder of the Flowers of the male Pœony freſh bruiſed and dryed in the Sun, one dram: make a Powder, to which add of the whiteſt Sugar, diſſolved in the water of Pœony, and boiled to the conſiſtence of Tablets ten ounces: of this make Lozenges according to art, each weighing half a dram; eat one or two of them often in a day.* *Tablets.*

Becauſe all things are not convenient to all Men, and that the *Phyſician* ought to try diverſe Medicines, and inſtitute various methods, and to try now this, now that, therefore we ſhall here add ſome other forms of another kind.

Take *of our Syrup of Steel ſix ounces, and drink a ſpoonful of it in the Morning, and at five in the Evening, with the diſtilled water, but now deſcribed, or any other Cephalick, to the quantity of three ounces; or take of our Tincture of Steel, from fifteen to twenty drops, in a draught of the ſame diſtilled water, twice in a day. I have known this to have given notable help to many.* *Chalybeats or Steel-Medicines*

Let there be given daily after the ſame manner, Doſes, ſometimes of the Spirit of Sut, Harts-horn, or of Sal Armoniack, impregnated with Coral, Amber, or the Skull of a Man: or of the Tincture of Antimony, Amber or Coral. *Spirits.*

Take *of the Powder of the Root of the male Pœony one ounce and an half, of the Seeds of Pœony, Coral prepared, and of the whiteſt Amber, each three drams; of Pearls prepared, of the Powder of the Flowers of the male Pœony, freſh bruiſed and dryed in the Sun, of each two drams; of Sugar-Candy one ounce: make a Powder, and take one dram twice in a day with a draught of Tea or Coffee, or a Decoction of Sage or Roſemary.* *Powders.*

For poor people may be preſcribed, *Powder of the leaves of the Apple-tree, Miſleto, dryed in the Sun, and powder'd, to the quantity of a dram, to be taken twice in a day.* Or take *of the whiteſt Peacocks dung ſix ounces, of the Powder of the Flowers of the male Pœony one ounce, of Sugar two ounces: make a Powder, of which let them take a ſpoonful twice in a day, in ſome convenient liquor.*

Let thoſe troubled with the *Vertigo* drink for their ordinary drink, ſmall Ale, with leaves of the Orchard Miſleto boiled in it inſtead of Hops, and in the Veſſel holding about four gallons, let a little bag be hanged, in which put half a pint of Peacocks dung, and three drams of Cloves bruiſed.

Examples of thoſe labouring with the *Vertigo* are ſo frequently met withal and almoſt daily, that there ſeems no need to add here any; but however, that the image or type of this Diſeaſe may be known, I ſhall only mention ſome few and more rare caſes. *Caſes and Examples of the Sick.*

A Divine about ſixty years of age, after he had been troubled for about three months with a light *Vertigo*, or as it were a frequent coruſcation or brandiſhing of the Spirits, in the fore part of the Head, at length the Diſeaſe growing worſe, he became ready to fall, and with a darkneſs before his eyes; in ſo much, that in walking he ſometimes would fall flat on the ground. Being ſent for to Cure him, I preſcribed *Phlebotomy*, with a gentle Purge, and after a little reſpite, to be repeated again; further, I took care to have the *Electuary*, and mixtures given him, ſuch as we noted above, with Bliſtering Plaſters, and other adminiſtrations not to be neglected: A fortnight after, no eaſe following from theſe, I gave him a Vomit of the Salt of *Vitriol*, and the infuſion of *Crocus Metallorum*, by which when he had eaſily vomited ten times, he began to find himſelf better, and by uſing further altering *Cephalicks*, for *The firſt Hiſtory.*

about

about a fortnight more, he became perfectly well, and from that time, for ſix years, he took yearly ſpring and fall a Vomit, with ſome other Medicines; though he continued in perfect health.

The ſecond Hiſtory. A certain Gentleman about ſixty ſix years of Age, when he had lived for a long time obnoxious to a light *Vertigo*, and that was wont to be excited only occaſionally, about the end of the laſt *Autumn*, labouring more grievouſly with this Diſtemper, he alſo became forgetful. Being ſent for to viſit this Man, after he had been ſick about three weeks, I found him very much changed in his looks and countenance, the vigor of both being diminiſhed. Seeing that he was daily diſtemper'd towards evening with a ſmall Feavour, his Pulſe beating high and vehemently: I firſt cauſed blood to be taken out of his Arm, and after ſix or ſeven days, out of the *Hæmorrhoidal* Veins; and then I took care for Bliſters to be made behind the Ears and hind part of the Neck, and two large Iſſues between the ſhoulders: Inwardly, at phyſical hours, he took daily *Cephalick* Medicines, almoſt of every kind. Within a months ſpace he ſeem'd to recover, and began to walk abroad, and to take care of his houſhold affairs, and other buſineſſes: but in the beginning of the Winter, taking cold by going daily abroad, he fell into a little Feavour, with a greater perturbation of the ſpirits within his Head: for becoming every evening delirous, he hardly knew what he ſaid or did. But within ſeven or eight days, blood being taken away, and a ſlender dyet uſed, the Feavour vaniſhed, but the diſtemper of the Brain was changed from its former ſtate. For the *Vertigo* wholly ceaſing, he became very forgetful, and *Paralytick*, in all his right ſide. As to his Head, being asked, whether it was clear, and free from the dizzineſs and confuſed Phantaſms; he anſwered, that as to thoſe things, he never was better in his life: For he well underſtood his infirmity, knew his Friends and Relations, and others who came to viſit him, but could hardly remember the names of any of them; and when he began to talk of any thing, he wanted words to expreſs his mind: Then as to his Diſtemper in his ſide, in his right Arm and Leg; there was not only a looſning wholly, and a want of motion, but in either there grew a great white wateriſh Tumor, in ſo much that not only the Cure, but his life was deſpaired of, to be long prolonged; yea, the Magiſtracy and Offices which he held, were ſought for by others.

However I did not deſiſt from my curatory work, the moſt skilful Phyſician Doctor *Wharton* being called to my aſſiſtance. Carefully adminiſtring to the ſick by our joint counſels, we preſcribed ſolutive Pills to be taken at times, and in Medicinal hours on other days *Cephalick*, *Antiſcorbutick*, and *Antiparalytick* Remedies: His head being ſhaven, we ordered a Plaſter of Gumms and Balſoms to be laid upon it, and the looſened parts to be anointed with Oyls and Balſoms, and to be ſtrongly rubbed. Whilſt theſe things were doing, with ſome ſucceſs as to the greater clearneſs of his intellect, I know not from what cauſe, he fell into a Feavour, in the midſt of the Winter, ſo that for ſeveral days and nights, he grew extreamly hot, with burning, great thirſt, and interrupted ſleep; his tongue being ſcorch'd, and having a white ſcurf, his Pulſe was high, his Urine red, and full of contents. We abſtained from *Phlebotomy*, by reaſon of his Age and *Palſie*, and eſpecially becauſe of the Dropſie begun in the diſtemper'd ſide: but with a ſlender dyet prepared of Barly Broths, and Grewel, we order'd him day by day *Juleps*, *Apozems*, and other Remedies moving Sweat and Urine; and when about this time the Iſſues between his ſhoulders flowed very much, the ſick man began to grow better as to his Memory, and Palſie, and from thence profiting daily, and by degrees growing well, of both his diſtempers, together with his Feavour, he was reſtored to perfect health within a fortnight, and is ſtill living in health.

The Reaſon of the Caſe deſcribed. In this ſick man there was a notable motion, and a various change or tranſlation of the Morbifick matter; for what was at firſt in the middle part of the Brain, *viz.* ſitting on the Callous Body, ſtirred up the cruel *Vertigo*; the ſame afterwards increaſed, and (as it is probable) being further diffuſed into the infoldings of the Brain, brought forgetfulneſs or oblivion to the former Diſtemper: Then foraſmuch as the ſame matter being moved by the Feavour, and a little diſcuſſed, falling partly on one of the ſtreaked bodies, brought the Palſie of one ſide, and being partly expulſed into the compaſs of the Brain, almoſt took away the Memory, the *Callous* Body in the mean time obtaining a clearneſs; and laſtly, it was not without the help of the other Feavour, that the Morbifick matter being diſcuſſed from theſe two laſt neſts, was wholly carried away, the ſick being reſtored to health.

The third Hiſtory. Lately being tired out with the continual complaints of a certain man, troubled with the *Vertigo*, after many other Remedies tried in vain, I preſcribed at length, that for the ſpace of a month, he ſhould take daily, twice a day, about a ſpoonful of the

the following Powder, drinking after it a draught of the Decoction of Sage or Roſemary, impregnated with the Tincture of Coffee.

Take *of the Powder of the Roots of the male Pœony two ounces, of the Flowers of the ſame bruiſed and dryed in the Sun one ounce, of the whiteſt dung of the Peacock half a pound, of white Sugar two ounces; make a Powder.*

It is ſcarce credible how much help he received from this Remedy; viſiting me after a month, he ſeem'd a new and another man; being freed of the *Vertigo*, he not only confidently walked about, but was able to take care of his houſhold affairs, and to meddle with any hard buſineſs, which he was not able to do before.

CHAP. VIII.

Of the Apoplexy.

The Seat of the Apoplexy.

AS the ſeat of the *Vertigo*, ſo alſo of the *Apoplexy*, ſeems to be within the ſame more inward cloyſter of the Brain, *viz.* the *Callous* Body; to wit, becauſe in either Diſtemper, although in a far different degree, the imagination and the common ſenſe are affected, *viz.* in the firſt, the irradiation of the Spirits is wont to be obſcured in ſome places, and as it were broken with interſperſed ſhades; but in the latter, the ſame is wholly darkened, and ſuffers a full eclipſe.

A Deſcription of the Diſeaſe.

The word *Apoplexy* denotes percuſſion, and by reaſon of the ſtupendous nature of the Diſeaſe, containing as it were ſomething divine, it is called a *Sideration* or Blaſting; for thoſe taken with it, being as it were Planet ſtruck, or with an inviſible *Numen*, fall ſuddenly to the ground, and being deprived of ſenſe and motion, and the whole animal function ceaſing (unleſs that they breath) they lye a long time as if dead, and ſometimes yield to death; But if they revive, oftentimes they are taken with an univerſal Palſie, or elſe of one ſide.

Its Subject.

The immediate ſubject of the *Apoplexy*, and the neareſt, are the Animal Spirits inhabiting that region of the Brain where the principle faculties of the knowing or underſtanding ſoul reſide; to wit, the *Callous* Body: but we conclude the mediate ſubject, to be the middle part of the Brain; becauſe from hence, the inſtincts of all ſpontaneous motions proceed, and in this, the perceptions of all ſenſible things are terminated: by what means the *Cerebel* and *Præcordia*, and all the other parts both Animal and Vital, are ſecundarily affected, we ſhall ſhew anon, when the *ſymptoms* of this Diſeaſe and their reaſons are delivered. Upon the coming of the *Apoplectick* fit, all the acts of every ſpontaneous and knowing function (to wit, which depend upon the brain it ſelf) are forthwith hindred and ceaſe; the reaſon of which is, becauſe the Animal Spirits being ſuppreſſed in their chief place of meeting, to wit, the *Callous* Body, both their next motion of expanſion in that place, as alſo their flowing forth into the nervous appendix, is wholly defective: For therefore, by reaſon of ſuch an eclipſe of them in that place, an immediate and an univerſal darkneſs is cauſed in the whole animal region, which is under this government: yet in the mean time, the Pulſe and reſpiration, as alſo the motion of the Ventricle and Inteſtines, are after a ſort performed, either perfectly and freely, or at leaſt interruptedly and with pain; foraſmuch as their actions proceed wholly from the *Cerebel*, which is not at all, or but little hurt by the Morbifick matter.

The ſpontaneous Functions only deficient in the Apoplexy.

But it will ſeem difficult to be explained, after what manner, and from what cauſes, the Animal Spirits are ſo ſuddenly, and all at once ſuppreſſed, and as it were extinguiſhed, about their firſt ſpring of emanation; ſo that all ſenſe and motion depending thereon ceaſes every where. Concerning this, there are many and diverſe opinions of Authors; whilſt ſome place the cauſe of the *Apoplexy* in the Heart, and others in the Brain; then ſome lay the fault on the intemperance of that, and others on the evil conformation of this. Further, the obſtruction of the Brain is ſaid by ſome to cauſe the *Apoplexy* in the greater Ventricles, by others in its Pores or leſſer paſſages: then the obſtruction being taken for the cauſe of the Diſeaſe, and wholly binding up the leſſer Pores of the Brain, is ſaid to excite the fit, either becauſe the afflux of the blood, for the begetting of Spirits is hindred from thoſe parts; or be-

The opinions of others concerning this Diſeaſe.

cauſe, the flowing forth or emanation from thence, of the Animal ſpirits is kept back. It would be a tedious thing to examine the opinions of every one, and to conſider the weight of their reaſons.

The Theory of this Diſeaſe is beſt ſhewn by the famous Dr. Webſer.

The *Theory* of this Diſeaſe ſeems to be very exactly delivered by the famous *Webſerus*; for in the firſt place, for the finding out of its ſo abſtruſe and hidden cauſes, he brings Hiſtories or *Anatomical* obſervations, in which the *Phænomena* are declared in many dead Carcaſes of thoſe dying of this Diſeaſe; to wit, in three ſtruck or blaſted, he had found the blood extravaſated or out of the Veſſels here and there in great clodders, and had largely marked the ſubſtance of the Brain; in another the Serous Colluvies had overflowed the whole head, both without and within the Skull. From theſe footſteps of this moſt hidden Diſeaſe thus detected, the Author concludes, "That the principal places affected are not the greater Ventricles, but the middle mar-"rowy ſubſtance of the Brain and Cerebel, which is every where porous, and indued with "very ſmall paſſages, both that the vital ſpirits may flow in thither from the blood, and "that the animal may flow forth: But indeed he affirms, That the whole cauſe of every "*Apoplexy* doth conſiſt in theſe two, *viz.* either in one of them, or both of them toge-"ther: to wit, either becauſe the flowing of the blood thorow the Arteries to the Brain "is deny'd, or elſe by reaſon that the flowing forth of the Animal Spirit from the Brain "and Cerebel, thorow the Nerves and Spinal Marrow, is prohibited; or for both theſe "cauſes together. As to the former, he propoſes a threefold means, whereby the "blood may be hindred; *viz.* Firſt, Either by reaſon of the obſtruction of the inner "*Carotid* Arteries, and of the *Vertebrals*, to wit, which happens in the greater Veſſels, "and chiefly about the aſcent of the Brain, from the blood concreted into cloddery "pieces; or in the leſſer Veſſels, which paſs thorow the brain from a Viſcous Mat-"ter planted in them: Or, Secondly, the flowing in of the blood is detained from the "brain, by reaſon of the compreſſion of thoſe Veſſels, which ſometimes happens, be-"cauſe the *Pariſthmia*, or Kirnels of the hinder part of the Neck, do ſo ſwell up, from "a Serous heap of watry Humors, that by preſſing together the Arteries paſſing "thorow, ſhuts forth the paſſage of blood to the Head. Or, Thirdly, The bloody "flood may be hindred, becauſe a Veſſel being preternaturally opened within the "Skull, great quantity of blood is poured forth, which ſhould otherways go to the "benefit of the brain. As to the other cauſe of the aſtoniſhing Diſeaſe, *viz.* from "the flowing forth of the Spirits being hindred, he affirms that may be cauſed by "two ways; to wit, either by reaſon of the obſtruction of the beginning of all the "Nerves, cauſed by a ſerous inundation, or by a ſudden compreſſion of the ſame; "which is cauſed either by an heaping up of too much blood in the *Meninges*, or in "ſome parts of the brain it ſelf, or in its Ventricles; or elſe by a diſpoſition of "the *Phlegmonodes*.

Another Reaſon given by the Author.

Theſe moſt ingenious reaſons indeed ſeem to challenge our aſſent, for that more probable or more likely are not eaſily to be brought; but becauſe we think ſome of theſe are to be altered, and others to be added, therefore we ſhall here inſtitute, though not a different, yet ſomewhat another reaſon of this Diſeaſe.

The Excluſion of the Blood from the Brain does not eaſily happen;

And in the firſt place, though we grant that the flowing in of the blood, may be ſometimes denyed to the Brain; yet we do not believe, that it only happens after the aforeſaid ways, nor that, for that reaſon, the *Apoplexy* doth ariſe. We have elſe-where ſhewed, that the *Cephalick* Arteries, *viz.* the *Carotides*, and the *Vertebrals*, do ſo communicate one with another, and all of them in ſeveral places, are ſo ingraffed one in another mutually, that if it happen, that many of them ſhould be ſtopped or preſſed together at once, yet the blood being admitted to the Head, by the paſſage of one Artery only, either the *Carotid* or the *Vertebral*, it would preſently paſs thorow all thoſe parts both exterior and interior: which indeed we have ſufficiently proved by an experiment, for that Ink being ſquirted in the trunk of one Veſſel, quickly filled all the ſanguiferous paſſages, and every where ſtained the Brain it ſelf. I once o-pened the dead carcaſe of one wafted away, in which the right Arteries, both the *Carotid* and the *Vertebral*, within the Skull, were become bony and impervious, and did ſhut forth the blood from that ſide, notwithſtanding the ſick perſon was not trou-bled with the aſtoniſhing Diſeaſe; wherefore, it may be doubted, whether the blood excluded from the Brain, by reaſon of ſome Arteries being obſtructed or compreſſed, doth bring forth this Diſeaſe. Certainly there is more of danger, that the cauſe of the *Apoplexy*, ſhould be from its too great incurſion and extravaſation within the Brain, as it was in the three *Apoplectick* people, cited by the Author; and that not only, becauſe the marrowie ſubſtance of the Brain was deprived of the Blood coming to its uſe, (for ſuch a defect might have been ſupplied by the other Veſſels, extend-ing their branches every where) but rather, becauſe by the extravaſated Blood, and

Becauſe all the Arteries communicate one with another, and ſome of them ſupply the defects of the o-thers.

not

not ſeldom being concreted into an hard and mighty bulk, the marrow of the Brain is preſſed together, the paſſages of the Spirits being by that means ſhut up.

But indeed, though we deny this to the afflux of the blood into the Brain, being hindred in any part only, yet it may be granted to its total excluſion, for therefore we have often noted, a want of all motion to be cauſed: which Diſtemper however hath been rarely taken for the aſtoniſhing diſeaſe, but rather is wont to be called a *Syncopy*, or Swooning away, or the *Hyſterical* Paſſion: If at any time the motion of the Heart be wholly ſuppreſſed, preſently, the Blood being retained without the Brain, the Animal Spirits fall down, even as the light vaniſhes when the flame is put out.

A total Excluſion of the blood from the Brain ſometimes happning, cauſes a terrible Syncopy.

The action of the Heart is ſtopped or hindred, either by reaſon of the improportionate flowing in of the Blood, as in the violent paſſions of fear or ſadneſs, or by reaſon of the Animal Spirits, which ſerve for its motion, being denyed by the Cerebel. This we think to happen ſometimes, becauſe of the *Cardiack* Nerves being Diſtemper'd with a Convulſion, or otherways bound together, after which manner it is uſual in Convulſive and *Hyſterical* Paſſions; ſometimes for the outward parts, as the Arms and Legs, and ſometimes the Inward, to wit, the Præcordia and Viſcera, one after another to be affected: but a want of motion follows the inordinations of theſe, in which the ſick lie for ſome time without motion or ſenſe, with a ſmall or ſeldom beating Pulſe as if dead. Which indeed ſo ſeems to come to paſs, by reaſon of the Cardiack Nerves being contracted at that time, and ſo the Spirits which were about to flow being ſuſpended; though we believe ſuch a want of motion ſometimes to be produced by the mere confuſion of the Spirits within the Brain, but in this caſe, the heart it ſelf is lively enough moved, and the Pulſe is alſo ſtrong and laudable.

This depends oftenest on the motion of the heart, being hindred, and ſo either becauſe of the Cardiack Nerves being bound together;

But beſides, it ſeems moſt likely, that the motion of the Heart is ofen ſuppreſſed or inhibited, by reaſon of the Animal Spirits, deſtinated to the vital function, being ſuppreſſed in the fountain it ſelf; to wit, within the Cerebel. We have mentioned this to be done in the Diſtemper of the *Incubus*: but without doubt it ought to be attributed to this cauſe, for that I have obſerved in ſome, a failing of the Spirits, with a ſudden privation of all the Animal functions to follow, upon a great weight in the hinder-part of the Head, in which the ſick become ſenſeleſs and immoveable, with the Pulſe and breathing very much leſſened, and ſcarce perceivable, and lye quite cold for many hours; yea oftentimes, a day or two, more like dead than living perſons. I have known ſometimes thoſe diſtemper'd, to be ſtiff and cold, Pulſe and breathing to be thought quite gone, and to be indeed eſteemed quite dead, and put into their Coffin, yet after two or three days to have reviv'd again: but whoever awakes out of this fit, whether it be of ſhort or long continuance, does not for that reaſon fall into a Palſie, or half Palſie of one ſide, as thoſe for the moſt part do, who are diſtemper'd with the *Apoplexy*. Further, no doubt but that many die from ſuch a Morbific cauſe, whoſe death wrongfully hath been aſcribed, either to the mortal *Syncopy*, or to the *Apoplexy* properly ſo called. Truly the caſe afterwards deſcribed, can only have the like reaſon given for it. Wherefore, though it may ſeem a *Paradox*, yet it is not incongruous to reaſon, that we affirm, that there is a twofold *Apoplexy*, one in the *Cerebel*, which we but now deſcribed; the other ſeated in the middle of the Brain, into the cauſes of which, and the manner of it, we ſhall now inquire.

Or, By reaſon of the Spirits in the Cerebel, being hindred from their flowing into the Nerves.

Hence there is a twofold Apoplexy, one in the Brain, the other proper to the Cerebel.

But here in the firſt place we muſt diſtinguiſh concerning the various aſſault or fit of this Diſeaſe, to wit, foraſmuch as ſometimes being excited, without any previous diſpoſition, or *Procatarxis*, from a ſudden and ſolitary cauſe, it is often invincible, and for the moſt part mortal; againſt this there can be no preventive method of healing, or preſervatories inſtituted; and the Curatory method which is wont to be taken, proves very oft ineffectual. Or, Secondly, the *Apoplectick* fit having an antecedent cauſe, or previous *Procatarxis*, is brought into act by reaſon of various occaſions, or evident cauſes.

The Theory of the former delivered.

This Diſeaſe either accidental, or habitual.

As to what belongs to the blaſting, or being ſtricken, of the former kind, to wit, ſuddenly and unthought of, its conjunct or next cauſe is, either a great ſolution or breach of the unity, happening ſome where within or near the middle of the Brain, by reaſon of which its Pores and paſſages being obſtructed or preſſed together, the whole emanation of the Spirits is ſuppreſſed: or elſe it is an huge and ſudden profligation of the Spirits, or an extinction of thoſe dwelling in the Brain. We ſhall ſhew the formal reaſons of both of them particularly, and the ſeveral ways of their being affected.

The cauſe of the former is, either a great breach of the unity in or near the middle of the Brain;

Or a ſudden ſtupefaction or extinction of the Spirits.

Extravaſated Blood, the breaking of an Impoſthum, and a great flood of Serous humor plentifully flowing forth, are wont to effect the greater breach of the unity within the Brain.

1. A Solution of the unity, either from blood let forth of the Veſſels; Or,

From Blood effuſed or extravaſated within the Brain, and there either growing together in clodders, or ſtriking on the affected places, doth often times cauſe mortal *Apoplectick* fits, as I my ſelf have proved by *Anatomical* inſpection in ſome others, beſides the inſtances brought by the famous *Webfer*; but ſuch Morbific extravaſations of the Blood within the Brain, proceed either from an external cauſe, as a fall from on high, or by a blow on the Head, or by hitting it againſt ſome hard thing, and the like; or from an inward cauſe, to wit, for that the Blood being ſharp and thin, and the little mouths of the Veſſels, and the places between being too looſe, it growing more than ordinarily hot, either of its own accord or occaſionally, and flowing forth thorow theſe, eaſily breaks into the ſoft and yielding ſubſtance of the Brain. Further, although we have aſſigned the ſeat of this Diſeaſe in the *Callous* Body, yet the blood, becauſe effuſed ſomewhere nigh or above it; becauſe it compreſſes the underlying Marrow, by intumifying the diſtemper'd places, cauſes the *Apoplectick* fit.

2. From an Impoſthume, or the breaking of an Ulcer; Or,

Secondly, An Impoſthum or Ulcer is rarely wont to be excited within the Brain, but often in the *Meninges*, and almoſt for the ſame occaſions, by which the extravaſation of the blood happens: while it is ripening, it cauſes only an Headach or heavineſs, but when it is broke, the filthy ſtuff flowing from it, into the ſhelly part of the Brain, gnaws and putrefies it, and then by degrees inſtilling its putrid particles, and very infeſtous to the Spirits, into the middle or marrowie part of the Brain, raiſes up at laſt the fit of the aſtoniſhing diſeaſe.

3. From a Deluge of the Serum.

Thirdly, The Serous heap or deluge being poured forth from the blood, into the Head, though rarely or never of it ſelf, yet ſometimes by reaſon of more ſtrong evident cauſes, runs ſo ſuddenly into the Brain, that filling and ſtuffing ſoon all its Marrowie Pores, cauſes aſtoniſhment or deprivation of ſenſe and motion: And this I have known to happen to ſome, from drinking of ſharp thin Wine, or *Spaw*-waters, and ſleeping upon it; and I have obſerved the like effect, from a long and total ſuppreſſion of Urine, alſo in *Hæmorrhages* (or fluxes of blood) being ſuddenly ſtopped: And laſtly, the Serous Recrements in malignant Feavours, being tranſlated to the Head, by a critical tranſpoſition, often cauſes a mortal ſenſeleſſneſs, or becoming ſpeechleſs.

An extinction of the Spirits from Opiates, or from immoderate Drinking of hot Waters.

Another kind of evident cauſes, from which ſudden blaſting or being ſmitten is wont to be cauſed, conſiſts in the ſudden profligation or extinction of the Spirits, which indeed doth not ſeldom or rarely happen, from ſtrong *Narcoticks*, or Medicines cauſing ſleep, and alſo from the immoderate drinking of hot waters.

The operation of Opiates, as it is aſſigned by the famous Webſer.

Though we have already diſcourſed concerning the uſe and effects of *Opiates*, I cannot however paſs over their way of affecting, aſſigned by that moſt famous Doctor *Webfer*. This Learned Man affirms, That *Narcoticks* only do too much open and dilate the Pores and paſſages of the Brain, and as it were open the doors of it, before faſt ſhut, whereby every extraneous and incongruous thing is admitted into the Chamber or ſleeping place of the Spirits, together with the ſubtil liquor poured forth from the blood; and ſo by a violent incurſion, diſſipates their ranks and orders. But indeed it appears from what hath been above ſaid, that *Narcoticks* do not only or always operate ſo; for we have ſhewn that whilſt they are yet within the Ventricle, they often cauſe ſleep, and ſometimes death it ſelf: Beſides, it ſhould follow from thence, that *Opiates* being often given ſhould bring ſtill a greater evil, becauſe by dilating more and more the Pores of the Brain, they cauſe a much more eaſie entrance to all manner of impurities; but truly it is clear enough, that *Narcoticks* are moſt hurtful at the firſt time being taken, and afterwards being often taken do little hurt, ſo that ſome accuſtomed to *Opium*, will devour a great quantity of it without hurt; which is certainly a ſign, that this doth not ſo much alter the conformation of the Brain as that it doth immediately agitate or work upon the Animal Spirits; whom at firſt (becauſe ſo very improportionate to them) it ſlays with a mere blaſt; then afterwards there being a certain familiarity between them, and this Medicine, it diſturbs them not.

The formal reaſon of the habitual Apoplexy.

Thus much concerning the cauſes of the accidental and ſudden *Apoplexy*, which falls indifferently upon all men, though not at all prediſpoſed: for which alſo there can be no preventive Medicines inſtituted, and it is rarely that it is cured. But beſides, we obſerve, that this Diſeaſe is ſometimes habitual, and that it remains as a conſtant diſpoſition in ſome men, by reaſon of which, at firſt they are exerciſed only with light skirmiſhes, but after ſome time they become more grievous, and of which at laſt for the moſt part they dye. Concerning this therefore, we ſhall inquire, 1. what the Conjunct Cauſe of this Diſeaſe may be, and the formal reaſon of it. 2. In what the *Apoplectick* Diſpoſition or *Procatarxis* of the Diſeaſe conſiſts: Then 3. What Evident Cauſes it hath.

1. As

1. As to the firſt, we may ſuppoſe, upon the coming of the *Apoplectick* fit, that a certain matter before heaped up, and diſperſed in the compaſs of the Brain, at length doth deſcend into its middle or marrowie part, and there doth aſſault all the Spirits, and ſuppreſs and beat them down in the very fountain of their emanation: Although it doth not plainly appear, whether they effect it either by ſtuffing only the Pores of the Marrow, or by driving away the Spirits themſelves, or by inflicting on them a numneſs; notwithſtanding it is likely, that it may be done by either of the ways. And indeed we ſay the medullary Pores of the Brain, may be ſomewhat ſtopped or obſtructed, becauſe the ſame matter, which at firſt ſetling on the *Callous* Body, cauſed ſenſeleſneſs, being ſliden down from thence lower into the *Callous* Body, and then ſtuffing its Pores, is wont to excite the Palſie of one ſide. But yet we may not conclude, that the ſideration or being ſtruck, doth ariſe only from the Pores of the Brain being ſtopped, becauſe then the fit would oftentimes creep on them gently, and by little and little; foraſmuch as all the Pores cannot be poſſeſſed by the inflowing matter at once, but ſucceſſively, and ſome after others: But when as this Diſtemper leaps upon one ſuddenly, and like lightning, what can we conceive leſs, than that the Spirits are ſtruck down as it were by a blaſt, from the malignant contact of the matter ruſhing upon them? For it ſeems, that its particles deſcending on every ſide from the compaſs of the Brain, into its middle part or the *Callous* Body, and entring it from every part, do preſently fill the paſſages how ſtrait ſo ever they be, and drive to flight hither and thither the Spirits, and compel them into a cloſe place, who being then beſet and reduced to a ſtrait corner, when they can neither reſiſt long, or are able to penetrate into other Pores poſſeſſed by the Morbifick matter, at length are ſtruck flat down, letting go every function of the knowing ſoul; but then they do not eaſily nor quickly riſe up again, becauſe they are not able to quit themſelves from the embraces, or bonds of the malignant matter, nor paſs any where into empty or open places; wherefore, they lie long ſuppreſſed, till at length ſometimes perhaps that matter, though leaſurely, is diſſipated, or ſupped up into the Blood, or iſſuing forth from the little Pores of the Marrow, ſlides forward into the Ventricles of the Brain; or at length, that matter ſliding a little lower, and being impacted on the Streaked Bodies, either one or both of them, cauſes the *Hemiplegia*, or half Palſie, or the Palſie: In the mean time, as the Spirits, within the *Callous* Body grow free, and getting wider ſpaces, they reſume their wonted offices; which they indeed execute, until new matter ſpringing again in the compaſs of the Brain, and being by degrees increaſed, deſcending into the *Callous* Body, brings on another fit; out of which, if the Spirits get not, by either of the aforeſaid ways, being wholly diſcomfited, they periſh by degrees.

1. What its Conjunct Cauſe is.

It conſiſts in the Pores of the callous Body, being ſuddenly ſtop'd, and the Spirits being driven away, by the contact of malignant matter.

If you ſhould ask after the nature or diſpoſition of this Morbific matter; it may be ſuſpected, that the Animal Spirits in the *Apoplexy* are plainly affected after another manner, than in Convulſive paſſions; to wit, thoſe obnoxious to this blaſting obtain a *Copula* contrary to the exploſive, that is, *Vitriolick*, rather than *Nitro-ſulphureous*; and ſo by it their ſpiritous-ſaline particles are wholly fixed, and are hindred from entring into any motions or exploſions, even as when the *Vitriolick* particles being beaten and combined with the fulminating gold, they quite take away its exploſive or letting off virtue, and congeal and render immoveable all other active particles, like the blowing of a freezing air. The Animal Spirits ſeem to be not unlike the ſame, and their *Copula*'s have divers ſorts of adjuncts, ſome of which induce an *Elaſtick* and very *exploſive* virtue, as in the Convulſive Diſtempers, and others a ſtupor, numneſs, or immobility, as in the ſleepy Diſeaſes, and alſo in the *Apoplexy* and *Palſie*.

What the nature or diſpoſition of the morbifick matter is.

Thus much concerning the Conjunct Cauſe, and formal reaſon of the *Apoplexy*; as to its *Procatartick* or fore-leading Cauſes, they are much after the ſame manner as in moſt other *Cephalick* Diſtempers; to wit, both the Blood is in fault, for that it affords to the Head extraneous particles, and very contrary, or as it were deſtructive to the Texture or conſtitution of the Animal Spirits, either begotten in it ſelf, or taken from ſome other place: and then the Brain is in fault, for that being weak in its diſpoſition, and ſo its Pores and paſſages too diſſolute and lax, ſo that it always and eaſily admits without impediment, the Morbific matter poured forth from the Blood. There is no need that we ſhould here reherſe or unfold particularly the peculiar reaſons of either, and the various ways by which it is done; but we ſhall rather referr you to what we have already ſaid very largely, concerning the foreleading cauſes of the inveterate Headach, and alſo of the *Lethargy*. Further, the like or the ſame evident cauſes, which were noted in thoſe Diſtempers, and in other ſleepy Diſeaſes, ought here to be taken notice of, to be ſhunned carefully by *Apoplectick* people.

The procatarctic Cauſe of the habitual Apoplexy.

From

The differences of this Diſeaſe.

From what hath been ſaid, the differences of this Diſeaſe may be eaſily known: 1. What we mentioned but now; The *Apoplexy* is either accidental, which is ſuddenly, and at once excited, without any foregoing cauſe, and almoſt indifferently in all, from ſome ſtrong evident cauſe; or it is wont to be eſteemed habitual, which depending upon a previous diſpoſition, hath frequent fits, by reaſon of ſeveral occaſions: 2. From the reaſon of the ſubject, this Diſeaſe is ſaid to be proper, either to the Brain or Cerebel, or common to both: previous and frequent *Scotomies* or dizzineſs with miſts before the eyes, and the Diſtemper of the *Vertigo*, denote the Brain more obnoxious to this Diſeaſe: A frequent Night-Mare, intermitting Pulſe, often Swooning and failing of the Spirits, argue the *Cerebel* to be evilly diſpoſed.

3. In reſpect of magnitude, it is either univerſal, every function, both merely natural and the ſpontaneous ceaſing; or it is partial, this or that part being affected by it ſelf, then for that the faculties of either, now all, now many only, yet none excepted ſuffer an *eclipſe*; for in either regiment, the morbific matter deſcending to the middle or marrowie part, poſſeſſes ſometimes all its whole ſubſtance, ſometimes part of it, to wit, the fore part, hinder, or middle part. 4. In reſpect of the antecedent cauſe, the *Apoplectical* diſpoſition is either hereditary or innate; or acquired by means of an evil dyet, or other accidents.

Its Prognoſticks

The *prognoſtick* or fore-judging of this Diſeaſe is always denounced deadly or dubious; for the *Apoplexy* is never without preſent or future danger. But it is worſt of all, in which, beſides the abolition of all the ſpontaneous functions, the Pulſe and breathing alſo are either deficient, or are performed laborioufly; and then for the moſt part it happens, with a foam at the mouth, and ſnorting; upon which comes a ſweat, which is often like melted greace, and indicates a very ſudden death to be at hand.

Thoſe who are blaſted or ſtrucken, and are preſently deprived of Pulſe and breathing, and a little after growing cold, and ſeem dead or without any life, are not preſently to be had from bed, or left deſtitute of Medicinal helps: further, though there be no hopes of life, they ought not to be buried under three or four days; becauſe ſuch do ſometimes revive again, either of their own accord, or by the uſe of Remedies: which certainly comes to paſs, not becauſe a vital heat is at laſt ſtirred up in the heart (for it is not there extinguiſhed altogether;) but becauſe the Morbific matter being diſcuſſed, or evaporated from the *Cerebel*, the motion of the heart is reſtored, like a Clock when the weights are put on.

In the *Apoplectical* fit, if any help follows upon letting of Blood, there is hope of health. But if after this and other Remedies, the Diſtemper continues without intermiſſion, above the ſpace of a night or a day, or grows worſe, the caſe is deſparate.

If after the firſt ſpeechleſs fit being over, the ſick perſon becomes more nummed and duller, and diſtemper'd with a *Scotomy*, and frequent *Vertigo*, it is a ſign that he will be obnoxious to more fits of this aſtoniſhing Diſeaſe: for the aforeſaid diſtempers proceed from the Morbific matter, already laid up in the compaſs of the Brain, and there flowing ſprinklingly, and thence deſcending thorow the very ſmall Pores only, into the middle part: which matter whether *Vitriolick* or *Narcotick*, growing to a greater fulneſs, calls on this blaſting or being ſuddenly ſmitten.

The Curatory Method.

The *Therapeutick* Method, is either Curatory, for the taking away the fit, when it is upon one; or preſervatory to prevent it, that it may not return: the former belongs to every *Apoplexy*, the other only to the habitual.

What is to be done in the Fit.

The aſſault or fit of this Diſeaſe being come, (if it proceeds not from ſome outward or vehement hurt of the head) although it is not known, whether it be excited or no from an invincible cauſe, ſuch as the Blood being let forth of the Veſſels, or the breaking of an Impoſthum in the Brain, yet we ought carefully to endeavour the Cure of it. And becauſe the blood being too hot or ſwelling up, is wont ſometimes to bring in the Morbific cauſe, or at leaſt to increaſe it, and the ſame ſinking down, and becoming more ſetled, ſometimes carries it away; therefore in the firſt place, you ought to deliberate, concerning the moderating its courſe. And here a queſtion ariſes, concerning the placing of the Patient, to wit, whether he ought preſently to be put to bed, or to be detained out of it for ſome time: ſome religiouſly obſerve the latter, and that not without reaſon; to wit, becauſe in Bed there is a greater propenſity to ſleep, and the blood growing hot, and flaming forth more plentifully, by reaſon of the heat of the Bed-cloaths, pours forth ſtill more recrementitious matter into the diſtemper'd Brain; on the contrary, whilſt the ſick is thinly cloathed, and placed in a Chair, the blood flows more ſlowly, and the ſinking Veſſels ſeem more apt rather to ſup back the humors out of the Head, than to ſend them thither.

In what poſition the Sick ought to be kept.

Wherefore,

Wherefore, if the Patient be ſtrong enough, it will be expedient perhaps to let him ſtay out of bed for ſix or eight hours, till the flux of the Morbific Matter paſſes over, and the courſe of the Blood be made more quiet by *Phlebotomy*, and other Remedies carefully adminiſtred: but the weak, and who are of a tender conſtitution, let them be put to bed as ſoon as they are ſmitten. But let not the ſick, whether in bed or up, lye upon his back, but with his head ſomewhat upright, and inclining either to one ſide or the other.

Phlebotomy.

Phlebotomy, neceſſary almoſt in all *Apoplectical* perſons, is not to be deferred: but the Blood is copiouſly drawn back by a ſtrong *Clyſter*. In the *Clyſter* may be diſſolved the *Species* of *Hieræ Diacolycinthia*, and a troubled Infuſion of *Crocus Metallorum*. Let a large Bliſtering Plaſter be applied to the hinder part of the Head, and other drawing *Cataplaſms* to the Legs and Feet: Let the Temples and Noſtrils be anointed with proper Oyls and Balſoms, and let painful rubbings be uſed almoſt to the whole Body: In the mean time, let things that ſtir up the Animal Spirits, and help them out of their bonds be given them; *viz.* Spirits of Harts-horn, Sut, and the like, with a *Cephalick Julep*.

Other ways of Adminiſtration noted.

Vomiting Medicines.

After this the ſick being placed in the bed (if he be able and doth eaſily Vomit) let an *Emetick* be given him, of the Salt of *Vitriol*, *Oxymel* of *Squills*, or an Infuſion of *Crocus Metallorum*, and then with a Feather put down the throat, provoke vomiting four or five times, drinking between whiles Poſſet-drink.

Comforters.

Vomiting being over, let there be given Comforters, as the *Elixir Vitæ* of *Quercitan*, Spirits of *Lavender*, or *Camphorated Treacle*, *Tincture* of *Pœony*, or of *Amber*, or of *Coral*, with *Apoplectical* Water, or other appropriate Waters in a convenient Doſe, and repeated as the buſineſs requires.

Cupping-glaſſes.

On the ſecond day, the ſame Remedies being ſtill continued, let dry Cupping-Glaſſes, or with Scarification, be applied between the ſhoulders, or to the hinder part of the Neck; or if more blood ought to be taken away, let the jugular Vein be opened; the *Clyſter* repeated; apply to the Noſe Spirit of *Sal Armoniack*, or a fume of *Galbanum* boiled in ſtrong Vinegar. Beſides, let *Errhines* or Sneezing Powders, and things to chew in the mouth to draw away Rheum be uſed. Then in the Evening let a Purge be ordered of *Pil. Rudii*, or a Solutive Electuary of Roſes, diſſolved in ſome liquor.

Hot or glowing Iron.

None of theſe things helping, though there be ſmall or no hope, the top of the Head being ſhaven, let glowing Iron be held over it, or a large Bliſter made upon it; and let the other part, eſpecially the Forehead, and forepart of the Head, be bathed with *Bezoardick* Vinegar; let Leeches be ſet to the Temples, or behind the Ears; let alſo a large Doſe of Spirits of Harts-horn, or of Sut, be often poured down the throat; theſe and other the like adminiſtrations, are to be uſed till you ſee death at hand; which (as *Celſus* ſaith) theſe ſort of Remedies only defer, but ſome times haſten life.

The preſervatory Method.

The *Prophylactick* or preventive Method, reſpects both thoſe who have been troubled with one or more fits, and alſo thoſe who are ſeen to be prone to it, as thoſe who are born of *Apoplectick* Parents, or are frequently obnoxious to the *Vertigo*, the *Incubus*, or Swooning away; alſo ſuch who have ſhort and brawny Necks.

Purging and Bleeding Spring and Fall.

Let Purging and Bleeding be ordered Spring and Fall, where it is convenient; as to the former, thoſe who are eaſie to vomit, let them firſt take an *Emetick*, of the infuſion of *Crocus Metallorum*, with the Salt of *Vitriol*, or of the *Sulphur* of *Antimony*; and then after three or four days, let there be given a Doſe of *Pil. Rudii*, or of *Amber*; and after a due diſtance between, let it be repeated three or four times: Let two large Iſſues be made between the ſhoulders; or if that place doth not pleaſe ſome, let them be made, in one of the Arms, and in the oppoſite Leg.

Cephalick Remedies.

On other days, free from purging, let altering and *Cephalick* Medicines be taken twice a day.

An Electuary.

Take *of the Conſerves of the Flowers of the Lilies of the valley (or of the male Pœony) ſix ounces, of the Powder of the Root of the male Pœony half an ounce, of humane Skull prepared three drams, of the Seeds and the Flowers of the male Pœony powdered, each two drams; of red Coral prepared, of Pearls, and of the whiteſt Amber, each one dram; of the Salt of Coral four ſcruples, of the Syrup of the Flowers of the male Pœony, what will ſuffice to make an Electuary: The Doſe two drams morning and evening, drinking after it two or three ounces of the following Water.*

A diſtilled Water.

Take *of the Roots of the male Pœony, of Imperatorian Angelica, each half a pound; of the Root of Zedoary, of the leſſer Galangal, each one ounce; of the leaves of the Orchard Miſleto, of Rue, Sage, and Betony, each four handfuls; of the outer rind*

of

of ten Orenges, and eight Lemons, of Cardomums, Cloves, Nutmegs, each half an ounce; all being cut and bruised, pour to them of white Wine (in which two pints of the dung of the Peacok hath been infused for a day) ten pints: let them infuse, close shut for three days; then distil it according to art, and let the whole liquor be mixed together.

Lozenges. Take *of the Species of Diambræ two drams, of the Powder of the Root of the male Pœony, of Zedoary picked, each one dram and a half; of Pearl one dram, of the Oyl of the purest Amber half a dram, of the whitest Sugar half a dram, being dissolved in six ounces of the water of Pœony, and boiled up to a consistence: make Lozenges according to art, each weighing half a dram: Let the Patient eat one or two often in a day, at his pleasure.*

Spirits and Tinctures. Within the fifteenth or twentieth day, that the Remedies may not be irksome, and may profit the better, let them be changed: therefore, instead of the *Electuary* let there be substituted for two or three weeks, sometimes the Spirit of *Sal Armoniack*, with Amber or Coral, or else impregnated with humane Skull or *Castor*; sometimes *Elixir* of *Pœony*, or *Tincture* of *Amber* or *Coral*, or *Elixir Vitæ* of *Quercitan*, or the simple mixture: also instead of it, may be drunk compounded Waters, or Water of black Cherries, or Walnuts; or the simple Waters of Rosemary, or Lavender; sometimes a draught of Posset-drink, with Flowers of the *male Pœony* or the *Lilies* of the valley boiled in it; or a draught of *Tea* or *Coffee* in the morning, (let the water of which it is prepared have such ingredients first boiled in it) or let *Chocalate* be prepared after this same manner.

Tea, Coffee, and Chocalate prepared, how to be made and taken.

Take *of the Powder of the Root of the male Pœony, of humane Skull prepared, each half an ounce; of the Species of Diambræ two drams, make a Powder; to every paper add of the Kirnels of the Cocoe Nuts one pound, of Sugar what will suffice; of this make Chocalate: take of it half an ounce or six drams every Morning in a draught of the Decoction of Sage, or of the Flowers of Pœony, or such like.*

A Powder. Take *of the Powder of the Root of the male Pœony, of humane Skull prepared, each one ounce and a half; of the pick'd Root of Zedoary, Cretick Dittany, Angelica, Contrayerva, each two drams; make a fine Powder of them all, add to it of the yellow of Orenges and Lemons Candied, each two ounces; let all be beaten to a Powder: take about half a dram, or a dram an hour before and after meals.*

For ordinary drink, *let a Vessel of four gallons be filled with ordinary Ale, in which six handfuls of white Horehound dryed had been boiled, of Anacardine and Cardomums cut and beaten, each one ounce and a half; of it make a bag to hang in it.*

Medical Aid. First of all, a very strict dyet ought to be ordered; let a temperate, dry and open air be chosen; let good and wholesome meats be eaten, and slender meals. Let suppers be sparingly taken, or none at all: Let noon-sleeps, drinking bouts, and other customary things about the non-naturals be shunned.

Examples. I could here propose many Histories of *Apoplectical* persons, to wit, of some who were once or twice touch'd, and yet living; and of others who have dyed at the first assault, or in the second or third fit. The most Reverend Father in God the Lord *Gilbert* Archbishop of *Canterbury*, recovered of a grievous *Apoplectical* Fit, six years ago, (God prospering our medicinal help, to whom we render eternal thanks) and from that time, though he sometimes suffer'd some light skirmishes of the Disease, yet he never fell, or became speechless or senseless. But we shall not stay upon this or other examples to unfold them largely, because there is nothing in them very rare, that may illustrate the *Ætiology* of this Disease. Some of their dead Carcases I have dissected, but only of such as the cause of death was from some former great hurt of the head, as some blow, or by means of some blast; in all which the extravasated Blood, or an Imposthum was the cause of their death: We have been prohibited often by their Friends, from opening those dying of an habitual *Apoplexy*, who expecting to have them revive again, held it as a deadly thing, and so wholly forbid *Anatomy*: But I shall here relate a notable *Anatomical* observation taken about five years since at *Oxford*.

A very rare History. An ancient Divine, an honest and a godly Man, indued with a fat body, a short and brawny Neck, being long unhealthy, and living a sedentary life, contracted a very *Scorbutick* evil disposition: being troubled with a difficult and laborious breathing, with an heavinesse of the Head, and unwonted numnesse, was scarce able to endure any thing of labour or exercise, more than that he daily went and came from his Chamber to the Chapel and Hall: one Morning he came to the Chapel a little before Prayers begun, and while he was on his knees, he was suddenly struck, and immediately

ately became ſpeechleſs and ſenſeleſs, and fell on the ground; but being carried thence, and his cloaths taken off, he was put into a warm Bed. I and other Phyſicians being preſently ſent for, and coming as ſoon as we could poſſibly, we found him not only without Pulſe, ſenſe, and breathing, but all his Body cold and quite ſtiff; nor could he be recalled to life or heat, by any Remedies or ways of adminiſtrations, though uſed for ſome time: by which we ſuſpected, that the Pulſe of his heart was wholly hindred at the firſt ſtroke, and that its flame being put out, preſently all motion of the Blood was ſuppreſſed.

An Anatomical Obſervation.

The next day, ſeeing the Carcaſe dead enough, and ſtiff, we opened it, nothing doubting but that the Diſtemper ſo ſuddenly mortal, would ſhew clear marks of it within the Head. But there, or in any other part, was not the leaſt ſhadow of this moſt cruel Diſeaſe: The Veſſels watering the *Meninges* were moderately filled with Blood, without any Inflammation or Extravaſation: The Brain, the Cerebel, and the oblong Marrow, with all their proceſſes and prominences, appeared every where thoroughout firm, and well coloured, both without and within: nor was there any Serum or Blood poured forth any where, within the Pores or paſſages, nor yet within the greater Ventricles, nor heaped up; yea the *Choroeidal* Infoldings placed both within the cavity of the Brain, and behind the Cerebel, ſeem'd free from all fault; ſo that the Morbific matter, equally thin and ſubtil like the Animal Spirits, whom it affected, remained wholly inviſible, and we could only argue its preſence by the effect.

But leſt this ſhould lye hid ſome where without the Head, after the contents of the head were diligently inſpected, we came to the Breaſt; where the diſcoloured Lungs being through the whole ſtuffed with a frothy matter, manifeſtly ſhewed the cauſe of the ſhort and difficult breathing. But the Heart was ſound and firm enough, free from any obſtruction or fleſhy Concretions. Further, neither in the neighbouring parts, or in others about the Viſcera, was found any Impoſthum or Ulcer, by whoſe contact or ſtink, the Heart could be ſuddenly oppreſſed, or the Vital Spirits (if this be poſſible) might be choaked.

Wherefore in this caſe, nothing could be ſuſpected elſe, but that the Animal Spirits implanted within the middle of the Cerebel, were put to flight, and as it were extinguiſhed ſuddenly, by ſome malignant, or *narcotick*, or otherways deadly Particles, ſo that the motion of the Heart preſently failing, like the firſt moving wheel in a Clock or Watch, immediately all the other functions, their impulſes being taken away, wholly ceaſed.

CHAP. IX.

Of the Palſie.

The middle of the Brain, which is the Seat of the Apoplexy is alſo the Seat of the Epilepſy.

THE middle of the Brain, or the *Callous* Body, to which we have aſſigned the ſeat of the *Vertigo* and *Apoplexy*, ſeems alſo to be the primary diſtemper'd place in the *Epilepſie*: Concerning which, as alſo concerning Convulſie Diſeaſes, ſince we have elſewhere largely treated, we ſhall therefore here paſs over purpoſely in this part of the Diſeaſes belonging to the Head, and according to our wonted method, deſcend yet lower, to the other regions of the Brain, and its dependences; and now we ſhall endeavour next to deſcribe the Diſtempers which belong to the Streaked Bodies, Oblong Marrow, and alſo to the Nerves, and nervous Fibres.

The ſtreaked Bodies, the Medullar Trunks, and the Nerves, are the Seat of the Palſy.

We have formerly ſhewed, that theſe parts do perform all the functions belonging to motion and ſenſe; wherefore, the failing or the enormities of theſe, are the affections of thoſe Bodies, or of the Spirits inhabiting them. But indeed ſenſe and motion are hurt chiefly after two manner of ways: to wit, either is wont to be perverted or hindred; when Motion is perverted, Cramps and Convulſions; when Senſe, pain ariſes; when either function or both together is hindred or aboliſhed, the Diſtemper is thence ſtirred up called the *Palſie*; which we are at preſent about to handle. Concerning Convulſion and Pain we have already treated.

What the Palſie is.

The *Palſie* is deſcribed after this manner, to wit, *That it is a reſolution, looſening, or relaxation of the nervous parts, from their due tenſity or ſtiffneſs; by which means Mo-*

tion and Senſe, to wit, either one only, or both together, in the whole Body, or in ſome parts, cannot be exerciſed after their due manner.

Its Conjunct Cauſes are, Obſtruction of the paſſages, and the Impotency of the Spirits.

The nervous parts are looſened, becauſe the Animal Spirits do not ſufficiently irradiate them, nor blow them up, nor actuate them with vigor. The cauſe of which defect is, either an obſtruction of the ways, by which their trajection or paſſage is hindred; or the impotency of the Animal Spirits, for that they are diſtemper'd with a numneſs, or that being but few in number they do not lively enough unfold themſelves. By reaſon of theſe various means of being affected, there ariſe diverſe kinds of *Palſies*. For in the firſt place, as to motion by it ſelf, this ſpontaneous faculty (which is chiefly and almoſt only lyable to the *Palſie*) is ſometimes taken away in the whole, or altogether in ſome parts; but ſometimes this, being only hindred, is leſſened or depraved. Secondly, In like manner alſo one ſenſe only by it ſelf, or more together, is ſometimes wholly taken away, and ſometimes only much diminiſhed or vitiated. Thirdly, Sometimes it happens that both powers are hurt at once. We ſhall ſpeak of each of theſe in their order; and firſt of the *Palſie*, in which ſpontaneous motion is aboliſhed; which we ſay is excited from two cauſes chiefly; to wit, the ways being obſtructed, and the Animal Spirits being touched with a numneſs, or as it were with a certain malignant blaſt.

In the Palſie either motion, or ſenſe only, or both together, is hurt.

Spontaneous motion is aboliſhed by reaſon of the ways being obſtructed, either in their beginnings, or the middle paſſages, or about the ends.

As to the former, an interception of the Spirits from the looſned parts, by reaſon of their paſſages being obſtructed, that always exiſting above them, is wont to be cauſed in various places, and for divers cauſes; but chiefly it happens in the firſt *ſenſory*, *viz.* in the Streaked Bodies, or ſome where about the Medullar Trunks, or laſtly in the Nerves themſelves; and ſo, either in their beginnings, or middle proceſſes, or in their extreme ends, (*i. e.*) the nervous Fibres. When the evil or hurt is brought to the Streaked Bodies, or the oblong, or ſpinal Marrow, it either obſtructs the whole Medullar thread or rope, from whence ariſes an univerſal Palſie below the diſtemper'd part; or one moiety of it, whence comes the *Hemiplegia* or Palſie of one ſide; or it affects in one ſide, or in both at once, the little heads of ſome Nerves, whence looſnings or reſolutions are cauſed in this or that member apart from the others.

The ways are obſtructed by Impletion, or Compreſſion, or by a breaking of the Unity.

There are many means whereby the ways or paſſages of the Animal Spirits are obſtructed in the aforeſaid bodies. Firſt, Either their paſſages are filled by an extraneous matter impacted in them: Or, Secondly, They are preſſed together by Blood flowing out of the Veſſels, a Serous deluge, or ſome Tumor lying upon them: Or, Thirdly and laſtly, the unity or continuity is broken, as by a ſtroke, or wound, or bruiſe, alſo by exceſs of cold or heat. According as theſe ſeveral places are diſtemper'd, and the ſeveral means of their being affected, we ſhall run thorow the chief caſes of the *Palſie*, together with the *Ætiology*, or reaſon thereof, with the manifold appearances of *Symptoms* in them; and in the firſt place we will ſpeak of the *Palſie* ariſing from an hurt brought to the common *Senſory*, to wit, the Streaked Bodies.

An obſtruction in the ſtreaked Bodies cauſes the Univerſal Palſie, or the Palſie of one ſide.

And indeed, that it ſo comes to paſs, I have proved by ocular inſpection, and ſhall be plainly demonſtrated anon by *Anatomical* obſervation. Further, as often as an univerſal or an half *Palſie* follows, (as it is often wont to do) upon a *Lethargy* the *Carus*, or *Apoplexy*, any one may conceive, that ſuch a change of the Diſeaſe, happens from a tranſlation of the Morbific matter; for that this at length going out of the Pores and paſſages of the *Callous* Body, which it at firſt poſſeſt, and ſinking down a little lower, runs into the Medullary tracts of one of the Streaked Bodies or perhaps both of them. And ſo, when the Animal Spirits are hindred from their wonted out-flowing, or irradiation into the nervous Stock, the motive faculty only, or (if the obſtruction be very great) both this, together with the ſenſitive, is hindred.

I have ſometimes obſerved in a *Palſie*, coming after a grievous fit of ſome other Diſeaſe, that all the moving parts, of either ſide, have been looſened after a more light manner: For though they were not able to perform the more ſtrong motive endeavours, yet for the moſt part they could extend, bend, yea and move their members hither and thither, to wit, becauſe the Morbific matter being diffuſed abroad, thorow both the Streaked Bodies, had not ſo cloſely filled every where all the paſſages: Moreover, on the contrary, I have known in a *Palſie* of one ſide, ſo ſuddenly excited, that there has been a far greater reſolution, ſo that they ſo ſtruck, were not able to move any way hand or foot, nor any other member on the diſtemper'd ſide. Further, ſometimes it happens, from the Morbific matter being copiouſly fallen down, and obſtructing cloſely all the Medullary tracts of one of the Streaked Bodies, that all the reſpective parts, have not only been deſtitute of motion, but ſome of them

them alſo of ſenſe; ſo that ſome members felt not any painful impreſſion, how vehement ſo ever it was. Such a Diſtemper happening in a leſſer degree, is wont to excite a ſenſe of numneſs, or pricking or tingling, ſuch as in members lean'd or lain upon.

Why ſenſe is not hindred as well as motion in every Palſie.

If it be demanded, why ſenſe is not always hindred as well as motion in every *Palſie*, ſince as it ſeems either is performed by the ſame Nerves and Fibres, within the ſame Medullary tracts, ſo that one faculty is only the inverſion of the other? as to this we may ſay, that as light beams thorow glaſs, when wind is excluded, ſo alſo ſenſe being ſafe, oftentimes motion is loſt. Beſides, ſenſe is only a paſſion, and a ſenſible impreſſion, which is propagated from the organ, by a continuity of the nervous proceſs, to the common ſenſory, without any endeavour or labour of the Spirits; which may be done, though the common ſenſory be in ſome meaſure obſtructed, and the Spirits inhabiting it benummed: But motion is a difficult and laborious action, to which is required, that the Spirits expand or ſtretch out themſelves lively, and not only put forth as it were exploſive endeavours in the moving organs, but chiefly about the parts, where the beginning of the motion and its firſt force is, and from thence, in the whole paſſage thorow the nervous parts. Wherefore, as but a few Spirits and bound, ſuffice for ſenſe; many, free, and expeditious as to their expanſions, are required for motion.

In an univerſal Palſie why all the Muſcles of the Eyes and Face are not looſned.

But that the Morbific matter being ſlid down into the Streaked Body, the Muſcles of the Eyes, Mouth, and Face, do ſtill retain their motions; it is becauſe that ſome of them, about the beginning of the Spinal Marrow, below all the Nerves, ariſing from the oblong Marrow, have their place of obſtruction; I ſay, that it is ſo, becauſe the Nerves deſtinated to the aforeſaid Muſcles, (the motions of which are ſtirred up by natural inſtincts) and brought from the fifth and ſixth pair, even as the Nerves ſerving the Præcordia and Viſcera, derive chiefly the influences of the Animal Spirits from the Cerebel; whoſe regiment, though the Streaked Body be diſtemper'd, remains often unhurt.

A Compreſſion of the ſtreaked Body ſometimes ſtirs up the Palſie.

Not only an obſtruction of the Streaked Body, but alſo a compreſſion ſometimes cauſes the *Palſie*, as ſhall be ſhewed by and by from *Anatomical* obſervation; to wit, when the blood is extravaſated, and growing cloddery within the inferior cavity of the Brain (and perhaps a Serous deluge is there heaped up) and doth lie heavily upon the Streaked Body, and preſs it together, ſo that for that reaſon, the Medullary tracts being bound together, are hindred from the Spirits flowing into them.

A Paralytick obſtruction doth ſometimes happen in the Oblong and Spinal Marrow.

Next after the Streaked Bodies, the ſeat of the Morbific Cauſe is in the oblong and ſpinal Marrow; alſo ſometimes in theſe, though rarely an obſtruction, but more often a compreſſion, or a ſolution of the unity, excite the *Palſie*.

As to the former, it is not probable, that great plenty of Morbific matter ſhould be ſent from the Brain, into this or that part together and in heaps; for ſuch a great and ſudden flux hardly happens beyond the ſtreaked Bodies. But it may be ſuſpected, that *Narcotick* or otherways deadly Particles, being forthwith poured forth into the Brain, and from thence thruſt forth into its appendix, doth at firſt ſtick within the more narrow ſpaces of the Medullary Trunk, and then by degrees being heaped up, cauſes the *Paralytick* obſtruction, whilſt theſe Particles are carried in the Brain here and there, in the *Callous* or Streaked Bodies they ſtir up frequent *Vertigoes*, and miſts before the eyes, and ſometimes in the motive parts ſhort numneſſes; but theſe being by degrees heaped up together within the Trunk of the oblong Marrow, or the ſpinal, foraſmuch as they poſſeſs all or part of its paſſage, and by that means either obſtruct all the Pores of the Spirits at once, or ſome ranks or orders of them, they bring forth either an half Palſie, or a looſening of ſome members, ſometimes the ſuperior, ſometimes the inferior.

A Palſie often ſucceeds ſtupidity, or becoming fooliſh.

I have obſerved in many, that when the Brain being firſt indiſpoſed, they have been diſtemper'd with a dullneſs of mind, and forgetfulneſs, and afterwards with a ſtupidity and fooliſhneſs, after that, have fallen into a Palſie, which I often did predict; to wit, the Morbific matter being by degrees fallen down, and at length being heaped up ſome where within the Medullar Trunk, (where the Marrowy Tracts are more ſtraitned than in the Streaked Body) to a ſtopping fulneſs. For according as the places obſtructed are more or leſs large, ſo either an univerſal *Palſie*, or an half *Palſie* of one ſide, or elſe ſome partial reſolutions of members happen.

A Palſie ſometimes from the preſſing together of the Marrowy Cord.

But in either Marrow, and eſpecially the Spinal, an interception or inhibition of the Spirits, creating a *Palſie*, moſt often happens from a compreſſion, or a breaking of the unity: The extravaſated Blood, or the Corruption flowing from the broken Impoſthum, and perhaps a Serous deluge being depoſited within the hollowneſs of the Back-bone; yea alſo an hard Tumor, being riſen ſomewhere in it, by preſſing

together the marrowy rope, ſhuts up the ways of the Spirits. Further, either a ſtroke, wound, or bruiſe of the Head, or *ſpine*; yea and a diſtortion of this latter, do often pervert or break off the Marrowy Tracts; yea an exceſs of cold taken in Froſt and Snow, ſtraitens and ſtops up the paſſages of the Spirits. Thoſe kind of caſes, and inſtances, being obvious enough to common obſervation, there will not be any need here to ſpeak of them particularly, or to unfold them more largely.

Sometimes from the unity being broke.

The Seat of the Palſie ſometimes in the Nerves themſelves, which are either obſtructed, or compreſſed, or the unity broken.

Thirdly, The Morbific cauſe being ſometimes planted lower, poſſeſſes either the greater Trunks, or the leſſer ſhoots of the Nerves themſelves; and that likewiſe is either an obſtruction or a compreſſion, or a breaking of the unity, by reaſon of any of theſe ways, and according to the like means of affecting, within the nervous paſſages, as in the marrowy, it is wont to be excited.

1. An Obſtruction. Sometimes in the beginning of the Nerves.

The oppilative or ſtopping Particles being fallen down, from the Brain, and carried forward into the oblong Marrow, enter into the Nerves, deſtinated to the Muſcles of ſome parts of the Face, and by obſtructing the ways of the Spirits in them, bring forth the *Palſie* in the Tongue, and ſometimes a looſening in theſe or thoſe Muſcles of the Eyes, Eye-lids, Lips, and of other parts; and then by reaſon of the contrary Muſcles being contracted beyond meaſure, they ſtir up a Cramp or Convulſion in the oppoſite part.

Nor is it leſs uſual, for the ſame Particles, for that they are fewer, to be carried yet further, without any great hurt into the Spinal Marrow; and laſtly going forth from it, to run ſometimes into the ſeveral Trunks of the Nerves, and ſometimes into ſome handfuls of them; and for that reaſon, to induce the Palſie to the ſeveral Muſcles or members, or in ſome of them only. As often as for this cauſe, the Muſcles of one ſide of the Neck are reſolved, or looſened, the other oppoſite being too much contracted, render the Neck twiſted or awry. It ordinarily happens, by reaſon of ſome private Nerves being ſo obſtructed, for ſome Fingers of the Hand, or Toes of the Feet to be looſened. But if many handfuls of Nerves together happen to be ſtopped, a *Palſie* follows, oftentimes in the whole Arm or Thigh. It would be too tedious to mention every caſe here, by which the Nerves are wont to be ſtopped, about their beginnings, middle proceſſes, or utmoſt ends, to wit, the Membranaceous or Muſculous Fibres, by reaſon of compreſſion, or breaking of the continuity, and ſo deny the exerciſe of the moving faculty to the reſpective parts: The reaſons of theſe kind of Diſtempers are ſo clear and manifeſt, and ſo commonly known, that it would be ſuperfluous to inſiſt on the opening them any longer. But we ſhall rather paſs to the other conjunct cauſe of the *Palſie*, which more immediately affecting the Animal Spirits, and ſometimes ſtriking down, and as it were extinguiſhing them, by mere contact, or as it were by a malignant blaſt, brings in a reſolution or looſening in the reſpective parts.

2. Sometimes in the middle.

3. Or in their utmoſt proceſſes.

The other conjunct cauſe of the Palſie, to wit, the impotency of the Spirits;

Often ariſes from narcotick or vitriolick Particles, by which the Spirits are put to flight.

What we before affirmed in the *Apoplexy*, we now again do the ſame in the *Palſie*, that there are deadly Particles, not only oppilative or ſtopping, but ſometimes *Narcotick* or *Stupefactive*, and as it were extinguiſhers of the Spirits; which kind of affection, if it be ſtrong, cauſes ſometime *Paralytick* Symptoms, without any great obſtruction of the ways. The breath or ſteams of *Antimony*, *Mercury*, or *Auripigment*, often cauſes weakneſſes, tremblings, and looſening of the Members, in ſuch as are long converſant among the Furnaces of *Chymiſts*, and of Metals. We may in like manner believe, that in ſome *Scorbutick* and very *Cacochymical* people, heterogeneous Particles, and as it ſeems of a *Vitriolick* nature (paſſing thorow the Brain, and its marrowy appendix) do enter into the nervous paſſages, together with their watering Juice, and caſt down ſome handfuls of the Spirits in them, or ſuppreſs their motion. Hence ſuddenly ariſe ſtupors, numneſs, or looſeneſs in the Members, or Muſcles, ſometimes in theſe, ſometimes in thoſe, and ſoon after vaniſhing in one place, preſently ſpring up again in another: But at length, when theſe ſort of Particles being abundantly poured forth into the Nerves, and laid up in heaps, they become variouſly fixed here and there; and moreover, ſhut up the ways of the Spirits, and ſo cauſe a fixed and permanant *Palſie*. And indeed, in every *Palſie*, made by obſtruction, the Morbific matter is not thick and cold Phlegm, (as *Galen* and many other Phyſicians have aſſerted) for ſuch doth not paſs thorow the Brain, much leſs the nervous paſſages; but it ſeems to conſiſt of moſt ſubtil and very active Particles, though infeſtous or deadly to the animal regiment: But indeed the *Palſie* happens in Men, no otherwiſe than the blaſting, or burning, or withering in Trees; becauſe ſome winds being indued with very frigid or cold blaſts, to wit, with a Nitrous or a *Vitriolick* Spirit, when they blow upon the green and tender ſprigs of trees, cauſe them ſuddenly to wither, for that the tender ſtalks like Nerves every where inter-woven with the ſprigs and leaves, are bound together by the blaſt of the malignant air ſo fully,

In every Palſie the matter is not ſo thick or cold, as it is vitriolick or other ways infeſtous to the Spirits.

The blaſting or withering in Trees like the Palſie.

that

that they receive not any more the Juice ſent from the Trunk or Root, by reaſon of which defect they wither. Much after the ſame manner, extraneous Particles, and as it were *Vitriolick*, being admitted within the organs of ſenſe and motion, for that they at once bind up the Pores, or caſt down or ſuppreſs from motion the Animal Spirits, cauſe in the reſpective parts, as it were a withering or drying up. But this is not ſo cauſed by mere Phlegm, or a Serous flood, as plainly appears, becauſe thoſe indued with a moiſt and cold Brain, have always their Noſe and Eyes moiſt, with the diſtillation of a ſnotty or watry humor; yea thoſe who are troubled with a Dropſical Brain, in which the Brain, and the tops of either Marrow do as it were ſwim in water, are not for that reaſon diſpoſed to the *Palſie*, unleſs by the preſſing together of the Marrow.

The more remote foregoing cauſes of the Palſy, which are two:

We have hitherto deſcribed the various caſes of the *Palſie*, and the means by which it is cauſed, together with their ſeveral formal reaſons, and conjunct cauſes. As to what belongs to the other cauſes of this Diſeaſe we muſt firſt diſtinguiſh, that it is either accidental or habitual: The former happens to ſome, from a ſolitary evident cauſe, ſuch as a ſtroke, wound, bruiſe, and exceſs of either heat or cold, without any previous diſpoſition; and beſides this, and the conjunct cauſe, which for the moſt part is a compreſſion, or breach of the unity, it hath none: The habitual Palſie depends upon a *Procatartick* cauſe, which is always an extraneous, and as it were a *Vitriolick* matter begotten ſomewhere before, and heaped up, which being from thence ſuffuſed into the organs of ſenſe and motion, for that it ſtops up the marrowy or nervous Tracts or ſometimes profligates the Spirits by mere contact, or effects both together, brings forth looſenings in the reſpective parts, by reaſon of the influence of the Spirits being deny'd them.

1. *More remote, to wit, a vicious Blood, and for that reaſon pouring forth a deadly matter upon the head.*
2. *Nearer, to wit, a weak and looſe Brain, admiting the evil Particles.*

This kind of *Procatarxis* or foregoing Cauſe, depends upon a twofold antecedent or ſecret leading cauſe, to wit, one remote, which is a vicious Blood, carrying to the Head a Morbific matter, either begotten in it ſelf, or taken from the Bowels, or ſome other place; and the other more near, which is an indiſpoſed Brain, to wit, weak, and too lax or looſe, or otherways evilly made, and ſo eaſily admitting heterogeneous, or ſtrange and deadly Particles.

The Palſy is either a primary Diſtemper, and a Diſeaſe of it ſelf;

The Morbific matter being brought to the Brain, ſometimes induces the *Palſie* primarily, but more often ſecondarily, and not but after other Diſeaſes firſt excited.

The reaſon of the former, (to wit, that the habitual *Palſie* be a primary Diſeaſe, and by it ſelf) requires theſe two things, *viz.* That the heterogeneous Particles be diſpoſed chiefly for the cauſing or ſtirring up the *Palſie*; then that they be admitted by degrees, and but in ſmall quantity, for if they enter in great heaps, they would firſt cauſe the *Carus* or *Apoplexy*: and if they be not of a plain *Vitriolick* nature or quality, when having paſſed thorow the Brain, they come to enter into the organs of Senſe and Motion, they would firſt occaſion in them Convulſive and painful Diſtempers, yea ſometimes the *Colick*, *Gout*, or *Scurvy* firſt, and then at length, the *Palſie*.

Or ſecondarily, viz. Coming upon or ſucceeding other Diſeaſes.

2. The ſecondary *Palſie* often ſucceeds Diſtempers for the moſt part *Chronical*, after the natural and vital faculties being by them very much hurt: a ſlow and long *Feavour*, ſtrength being at length worn out, cauſes oftentimes enervations or reſolutions of the whole Body, or of ſome Members. Long and immoderate ſadneſs, a Conſumption, a *Scorbutick Atrophy* or waſting, being long fixed in Bed, unhealthy old Age; yea and many other paſſions, after a notable evil firſt brought to the Brain, and nervous Stock, at length brings on the *Palſie*. But indeed this Diſeaſe more frequently comes upon ſome other Diſtempers, either of the Brain, as chiefly the *Carus* and *Apoplexy*, or of the nervous ſtock, and ſuch chiefly are the *Scurvy*, *Convulſions*, *Colick*, and *Gout*. By what means it ſucceeds *Cephalick* Diſeaſes, we have already ſhewed in this; and how the Scurvy, in another tract: we ſhall now inquire how it is often the off-ſpring of the other three.

Wherefore the Palſie often ſucceeds Convulſive Diſeaſes.

1. We have ſhewn already, that the *Spaſme* or *Cramp* or Convulſion, doth ſometimes bring in the *Palſie*, to wit, when from contrary or oppoſite Muſcles, being one of them looſened and the other pulled together: Further, it is an uſual thing, for thoſe who are long obnoxious to Convulſive Diſtempers, to ſuffer at length debilities in ſome members, and at length reſolutions or want of motion. I have known many *Epileptical* perſons, and others troubled with Convulſions, by reaſon of the motive function being aboliſhed or inhibited, in this or that part, to become at firſt lame, and then Bed-rid; the reaſon of which ſeems to be, becauſe the Morbific matter, being continually admitted within the tracts of the Brain and its appendix, both medullar and nervous, and often thruſt forth, doth at length ſo debilitate and dilate

dilate them, ſo that it gives an open paſſage beſides to other kind of Particles, either *Narcotick* or *Vitriolick*; by reaſon of which, the *Palſie* comes after the Convulſion. Further, I have often obſerved, by reaſon of the diverſe mingling of the Morbific matter, (like as when Rain and Snow happen together) that the ſick have at once been infeſted both with Convulſive motions, and the *Palſie*. A notable example of this, with the reaſon of it, we have fully deſcribed in our Tract of Convulſive Diſeaſes, *Chap. IX. p.* 115.

Wherefore the Diſtemper of the Colick.

2. They who are frequently and grievouſly obnoxious to the *Colick*, at length become alſo *Paralytick*. The caſe is ſo frequent here, that the ſucceſſion of this Diſeaſe is accounted among its *prognoſticks*; for thoſe who are wont to ſuffer cruel fits of torments in the Belly, returning by intervals, or are troubled with pains about the Viſcera of the *Abdomen*, cruel and almoſt continual, at length have wandring pains in their Body and Members, and then afterwards ſtupors or numneſs, and laſtly reſolutions or want of motion. The cauſe of theſe effects proceeds, both from the ſeat of the Diſeaſe, and the Morbific matter being changed, to wit, this, which being very ſmall but ſharp and irritative, runs only into the *Sphlanchnick* Nerves, and ſo by reaſon of the Fibres of the *Viſcera* being pulled, did ſtir up in them Cramps and pains; afterwards becoming more copious, and alſo duller and *Narcotick*, pours down thorow the *Spinal* Marrow, and entering into the Nerves deſtinated to theſe or thoſe Members or Muſcles, brings forth reſolutions in the reſpective parts. We ſhall more largely ſhew the reaſon of this, when we treat of the *Colick*.

3. Wherefore the Gout.

It is a very ordinary obſervation, that the *Palſie* comes upon the *Gout* frequently, in the Members obnoxious to it; the reaſon of it is eaſily known, foraſmuch as in this ſickneſs the Morbific matter is twofold, and doth depoſe ſalt and as it were lixivial Particles thorow the Arteries, and as we ſuppoſe others ſouriſh or acetoſous to come to them by the Nerves; (as ſhall be more largely ſhown hereafter) it is no wonder, if that at length, other ſorts of Particles become companions to them, by other beaten ways, and at length either by filling or by compreſſing, obſtruct the very ſmall paſſages of the Spirits.

The evident Cauſes of the habitual Palſie.

As to what belongs to the evident cauſes of the *Palſie*, to wit, for what fore-cauſes or occaſions thoſe diſpoſed to this Diſeaſe contract it the ſooner, or that having been taken with it already, are yet wont to be more grievouſly tormented; I ſay, whatſoever doth more vitiate the Blood, alſo thoſe things that ſtop up the Brain and its nervous appendix, or ſtir up ſuffuſions of the Morbific matter in it, alſo what do inflict a *Narcoſis* or ſtupefaction to the Spirits, or leſſen their numbers, may be brought hither. In this rank firſt occur the diſorders in the ſix non-naturals, an evil manner of living, drinking thin clear Wine, or ſtrong hot liquors, too much ſleep, or too untimely, an idle and ſedentary life, immoderate *Venus*, too much loſs of blood, a moiſt Air or Marſhie dwelling, an Houſe new Plaſtered, Metalick fumes and vapors, frequent uſe of Narcoticks, or ſtupefying Medicines, or too much taking Tobacco, exceſs of cold, heat, or moiſture, vehement and long paſſions of ſadneſs or fear, with many others, all which we have not here leaſure to recite.

Want or paucity of Spirits oftentimes the Cauſe of the Spurious or Baſtard Palſy.

Thus much concerning the *Palſie*, in which the loco-motive faculty is aboliſhed or loſt, or very much hindered; by reaſon of the ways of the Spirits being obſtructed, and themſelves affected with a certain ſtupefaction, in the whole, or in the reſpective parts. There follows another kind of this Diſeaſe, depending upon the want and fewneſs of Spirits, in which, although motion be not deficient in any part or member wholly, yet it is not performed by any but weakly and depravedly only. For though the diſtemper'd are free from want of motion, they are not able however to move their members ſtrongly, or to bear any weight; moreover, in every motive indeavour, they labour with a trembling of their limbs, which is only a defect of debility, and of a broken ſtrength in the motive power. For when ſtrength is wanting for the lifting up of any member firmly, and at one eſſay or endeavour, Nature flagging, acts with a more often repeated tryal or endeavour, and ſo the part being in motion, is compelled as it were to ſhake and tremble. To which happens, that when the nervous Fibres flagging or growing weak, they are not able to ſuſtain the Tonick endeavour, or the ſtiffneſs in the Animal regiment, and theſe endeavouring or ſtriving to exert or put forth their utmoſt power, enter into motions as it were Convulſive, and reiterate them perpetually. Wherefore, in ſome *Paralyticks*, there is always a trembling and ſhaking in all the limbs.

Thoſe who thus become *Paralytick*, by the paucity or want of Spirits, and ſo from their ſmall or diminiſhed diſpenſation into the nervous *Syſtem*, are made obnoxious to ſuch a Diſtemper, by reaſon of various cauſes and occaſions.

Firſt,

Firſt, Extream or unhealthy old age, or immoderate loſs of blood, or the genital humor, induce this kind of *Paralytick* diſpoſition in many men; to wit, becauſe from the waſted blood and almoſt liveleſs, there is ſtilled forth into the Brain but a very ſmall ſtock or proviſion of Animal Spirits. *For this Reaſon Old Men are obnoxious to this Diſeaſe.*

Secondly, Almoſt for the ſame reaſon, the loco-motive faculty grows weak or fails in perſons greatly *Scorbutick*, and ſuch as are full of indigeſted juice; for ſuch not being fit for any ſtrong exerciſe, go infirmly and weakly, and are very much tired by any long or ſwift walking; further, by any more heavy endeavour, they ſuffer often times a numneſs in their limbs, with an impotency of moving them. For indeed, the bloody Maſs is in theſe very watry, and ſtuft with impurities, and for that the Brain being weak and looſe, as to its Pores, admits eaſily all ſorts of filthineſſes into it ſelf; wherefore, fewer Animal Spirits being only created, and thoſe not clear and ſubtil, but dull and hindred, by the adheſion of a more thick matter (although there is not always an obſtruction of the ways, or a *Narcotick* diſpoſition) they are not able to unfold themſelves into motive endeavours. 2. *Alſo Scorbutical Perſons, and ſuch as are full of ill humours.*

Thirdly, Not only *Scorbutical* perſons, but alſo many others, hardly and long growing well from ſome *Chronical* Diſeaſe, are diſtemper'd with Members very much looſened from their due vigor and ſtrength, and with a languiſhing of their Limbs; that though they are well in their ſtomach, and have a good and laudable Pulſe and Urine, yet they are as if they were enervated, and cannot ſtand upright, and dare ſcarce enter upon local motions, or if they do, cannot perform them long: yea, ſome without any notable ſickneſs, are for a long time fixed in their Bed, as if they were every day about to dye; whilſt they lye undiſturbed, talk with their Friends, and are chearful, but they will not, nor dare not move or walk; yea they ſhun all motion, as a moſt horrid thing. Without doubt in theſe, although the Animal Spirits do after a manner actuate and irradiate the whole nervous Stock, yet their numbers are ſo ſmall, and in ſo few heaps, that when as many ſpirits ought to be heaped together ſomewhere in it for motion, there is great danger leſt preſently in the neighbouring parts, their continuity ſhould be broken. Wherefore, when the ſpirits inhabiting the Brain, are conſcious of the debility of others diſpoſed in the Members, they themſelves refuſe local motions, for that it would be too difficult a task to impoſe on their companions; wherefore, the ſick are ſcarce brought by any perſwaſion, to try whether they can go or not; Nevertheleſs, thoſe labouring with a want of Spirits, who will exerciſe local motions, as well as they can, in the morning are able to walk firmly, to fling about their Arms hither and thither, or to take up any heavy thing; before noon the ſtock of the Spirits being ſpent, which had flowed into the Muſcles, they are ſcarce able to move Hand or Foot. At this time I have under my charge a prudent and an honeſt Woman, who for many years hath been obnoxious to this ſort of ſpurious *Palſie*, not only in her Members, but alſo in her tongue; ſhe for ſome time can ſpeak freely and readily enough, but after ſhe has ſpoke long, or haſtily, or eagerly, ſhe is not able to ſpeak a word, but becomes as mute as a Fiſh, nor can ſhe recover the uſe of her voice under an hour or two. 3. *Alſo others long ſick.* *Hence ſome dare not venture on local motion.* *Others endeavouring, cannot bear them long.*

In this kind of ſpurious *Palſie*, ariſing from the defect, or rather the weakneſs of the Animal Spirits, than from their obſtruction, it may be ſuſpected, that not only the Spirits themſelves, as to their firſt numbers of them, and particular originals, are in fault; but beſides, that ſometimes the imbecillity and impotency of local motion, doth in ſome meaſure alſo depend upon the fault of the exploſive Copula, ſuffuſed every where from the blood, into the moving Fibres. For indeed, from a very *Cacochymical* blood, or full of juice, and for that cauſe vappid, and liveleſs; as the Animal Spirits are but few, that are inſtilled into the Brain, ſo it is probable, that thoſe themſelves derived from the Brain, into the Nerves, being diſpoſed at length within the muſcular Fibres, do meet with other Nitro-ſulphureous Particles (which we have ſomewhere ſhown to be neceſſarily required to the Muſculary motion) from the ſo vitious blood that are but dull, and degenerate, from the Elaſtick power; wherefore indeed the Spirits being concreted ſo evilly within the Muſcles, even as Gunpowder being full of more thick feculences, rarely and weakly perform the acts of exploſions. *The Impotency of the Spirits proceeds in ſome meaſure from the default of the exploſive Copula.*

As to what belongs to the other ſpecies of the *Palſie*, in which the ſenſitive faculty is alſo affected, we ſay, that this is hurt either by it ſelf, or together with the motive; and ſuch an hurt of both together, doth almoſt only happen, foraſmuch as the paſſages and ways of the Spirits are more firmly ſhut up, ſo that whether they tend forward or backward all their irradiation is intercepted: That ſometimes happens, though rarely from the Morbific matter fallen down from the Brain into the oblong Marrow, but more often by reaſon of a grievous hurt of the Spine or Back-bone, 2. *The kind of Palſy, in which Motion and Senſe are hurt at once.*

as

as from a fall from on high, ſtroke, or wound inflicted on them: For from ſuch occaſions, by compreſſing the marrowy cord, or by too much diſtending or writhing it, all the tracts of the Spirits are blotted out.

3. Kind, in which ſenſe only is affected. Sometimes the ſenſitive faculty is hurt by it ſelf, the motive being ſtill ſafe; this is ſufficiently obvious, and the reaſon very clear, of the organs, whoſe Nerves are only ſenſible, to wit, as of the ſight, hearing, taſt, and ſmell. But indeed, that in the extream habit of the body or members, the touch or feeling ſometimes periſhes, the loco-motive power being unhurt; as is ordinarily diſcerned in Lepers, thoſe diſtemper'd with the *Elephantiaſis*, and ſome Mad-men, who are wont to go naked, and lye on the ground, whoſe skin and muſculous fleſh are ſo benumned, that they feel not the gaſhes made in their fleſh with a Pen-knife, nor Needles any where thruſt into them; this I ſay ſeems very hard to be unfolded. But as to this it may be ſaid, that perhaps the ſame Nerves, carry the inſtincts of motions, and the impreſſions of ſenſible things forward and backward, or to and fro, but that the ſame Fibres, which are loco-motive, are not altogether or chiefly ſenſible. We have elſewhere ſhewed, that its power is performed by the tendinous and muſculous Fibres; but the ſenſible Species, is almoſt only received by the membranaceous Fibres; wherefore, the outer skin is the primary organ of feeling; after this, the Membranes covering the Muſcles, and laſtly thoſe conſtituting the Viſcera, are ſomewhat affected by the Tangible object. Wherefore, the loſs or hurt of feeling ariſes, by reaſon of an hurt, brought to the exterior Membranes; to wit, when the Fibres of theſe are obſtructed by a *Vitriolick* matter, or are benummed very much by exceſs of cold; ſo that the Animal Spirits, which ought to receive their impreſſions, are excluded from their organs. And indeed, from hence it appears, that theſe inhabiting the exterior Membranes, are only affected, becauſe ſenſe being loſt, the members wither not, as when deprived of motion, but remain full and round; which is a ſign that the Animal Spirits entring ſtill the Nerves, and fleſhy Fibres, do contribute their virtue to the office of nouriſhment; after what manner we have already ſhewn; but when motion is loſt, the Spirits are almoſt wholly baniſhed from thoſe parts, and the fleſh conſumes, becauſe the nouriſhing matter, though carried thorow the Arteries, is not aſſimulated. We have largely diſcourſed of this in our Treatiſe of the Nerves.

Wherefore feeling is ſometimes loſt, and motion ſafe.

What is the proper Organ of feeling.

The Prognoſtick of the Palſy. The Theory of this many-form'd Diſeaſe being now at length finiſhed, its kinds and differences, all, or at leaſt the moſt and chiefeſt of it, together with the reaſons of each of them, being rehearſed in order, we ſhall ſhew next thoſe things which belong to its prognoſticks and Cure.

1 Every *Palſie*, whether accidental or habitual, and either of them, whether univerſal or partial, or whether ſuddenly excited or by degrees, if it happens that the knowing and vital faculty be unhurt, it ought not to be accounted an acute Diſeaſe; but being free from ſudden danger, admits a long Cure, or at leaſt an endeavour of it.

2. This Diſeaſe coming from a ſolitary evident cauſe, as from a ſtroke, a fall, wound, *&c.* or coming upon the *Apoplexy*, *Carus*, *Convulſion*, the *Colick*, or other Diſtempers of the Brain, or nervous *Syſtem*, if it be not in a ſhort time altered for the better, or gives not place to Medicines, it remains for the moſt part incureable.

3. If that a total reſolution follows, from a total obſtruction in the beginning of the oblong Marrow, or from the Back-bone being vehemently hurt, and that ſenſe and motion are both taken away, the Diſtemper is hardly, or ſcarce at all to be Cured.

4. Thoſe who are once cured of a *Palſie*, ariſing from an evident ſolitary cauſe, do not ſo eaſily relapſe into the ſame, as when the Diſeaſe depends upon a *procatartick* cauſe.

5. A *Palſie*, happening to men of years, to *Cacochymical*, very *Scorbutical*, and intemperate perſons, although the Diſtemper be not very great, is difficultly Cured.

Its Cure. As the *Palſies* are manifold, and are from diverſe cauſes, ſo the Cure is not to be inſtituted always after one manner, but after a various method, to wit, appropriate to every kind of this Diſeaſe. For the moſt part there are theſe three kinds of it, or rather there are three means of healing; of which there ought to be had concerning the Cure of this Diſeaſe, now this, now that, or now another; to wit, becauſe reſolution (whatever, or in what place ſoever it be) is either cauſed, 1. from an external accident, as a ſtroke, a fall, a wound, exceſs of cold, or the like, ſuddenly: Or 2. It ſucceeds to ſome other Diſtemper, as the *Apoplexy*, *Carus*, *Colick*, or a long Feavour: Or, 3. It is primary and a Diſeaſe by it ſelf, by degrees excited, and depending upon a *procatartick* cauſe, or a previous proviſion. Concerning each of theſe, we ſhall ſpeak particularly.

Three means of healing, according to which this Diſeaſe is, 1. Either accidental; 2. The off-ſpring of another Diſeaſe; 3. Habitual.

1. Therefore

1. Therefore, when the *Palſie* is cauſed, by reaſon of ſome accident, with a vehement hurt, there are not many intentions of healing; but only that the part hurt may recover its priſtine conformation. And firſt of all, that the Blood and other humors flowing to it, being weak and diſtemper'd, and ſtaying there, might not increaſe the hurt, *Phlebotomy* is moſt requiſite in this caſe, and preſently to be celebrated; then the belly being made ſlippery by the uſe of Clyſters, and a ſlender dyet, if the matter requires it, let there be inſtituted either eaſily digeſted meats, or moderate *Hydroticks*, or water meats; to wit, that whilſt the ſick is kept in bed, he may continue in a gentle ſweat, that all the ſuperfluities may copiouſly exhale from the hurt part, and that the Spirits being gently agitated, may repeat their former ways and tracts, within thoſe Pores and paſſages, ſo unlocked by the warm Effluvia's. *1. The Cure of the former.*

For this end, the Powder *ad Caſum*, deſcribed in the *Auguſtan Pharmacopœa*, or as it is in ours, is of common uſe; let there be given of *Iriſh* Slate, to the quantity of about a dram, in a draught of white Wine warm'd, or of Poſſet-drink made of it; and repeated every ſix or eight hours. Beſides, if there be at hand the *Decoctum Traumaticum*, let it be taken ever now and then, frequently in Poſſet-drink, or a Decoction of the Roots of Madder, or of Butter-bur, or of St. *Johns-wort* Flowers. *A Powder for a Fall.*

Further, in the mean time, let the diſtemper'd part be carefully lookt to, which may be eaſily known, partly from the hurt inflicted, and partly from the looſened members. If there be any thing diſlocated in it, you muſt take care that as ſoon as it can, it may be put again in its place; if a Tumor, Contuſion, or a wound be excited, they are to be ſuccour'd by *Balſams*, *Liniments*, Stuphes or Fomentations, or Pulteſſes: But if nothing preternatural appears outwardly, let a Plaſter of *Oxycrocium* and of Red-lead, each alike, what will ſuffice, be laid upon it, and let the ſick be kept quiet, and in a moderate heat, for three or four days. If the reſolution remains confirmed, and the afflux of new matter be not feared, let more reſolving and diſcuſſing Remedies be applied to the diſtemper'd places; wherefore, make uſe of Fomentations, and hotter Oyntments, yea natural Baths, if they are at hand, or at leaſt artificial. Sometimes it may be expedient for the diſtemper'd Members to be wrapped in Horſe-dung, or in warm grains, and to be kept ſo for ſome time; and laſtly, between whiles, beſides the uſe of theſe, to add Clyſters and gentle Purges. But if no help follows theſe adminiſtrations, the ſick ought then to be handled with the like long method, and with the ſame Remedies, as thoſe that have an habitual *Palſie*, or any other coming upon other Diſeaſes and confirmed; which means of Cure, for every common *Palſie* more deeply rooted, ſhall be ſhewed anon. *Topicks to be applyed to the Diſtempered part.*

2. When the *Palſie* coming upon a *Feavour*, *Apoplexy*, *Carus*, or other *Cephalick* or Convulſive Diſeaſes, is greatly and ſuddenly excited, firſt the Phyſician ought to endeavour the taking away of the conjunct cauſe, which hath almoſt ever its ſeat in the oblong or ſpinal Marrow. Wherefore, at the beginning of the Diſeaſe, Blood-letting, and Purging (if nothing ſhews the contrary) Clyſters, Veſicatories, Cupping-glaſſes, Sneezing Powders, Oyntments, and other adminiſtrations uſed in *Cephalick* Diſeaſes, to wit, which by any means may ſhake off, or pull away the deadly matter, fixed to the Medullary Trunk, or to the little heads of the Nerves coming from it, are to be made uſe of. If that at firſt, the force of Medicine effects nothing within fifteen or twenty days, for that the Diſtemper is radicated, and become habitual, it muſt be expunged by a long method, and equally by preſervatory as well as curatory Indications; of which we ſhall ſpeak anon. *2. How the Palſie coming upon another Diſeaſe is to be cured.*

3. The habitual *Palſie*, depending upon a *procatartick* cauſe, whether it be in *fieri* or in diſpoſition, or whether it be made, or in the neſt or bird, either requires a peculiar means of healing. *The Cure of the habitual Palſie.*

There are two chief cauſes of the former, in both which the Curatory Method, reſpecting only the fore-leading Cauſes, is deſigned after the like manner, to wit, whether any falling dangerouſly ill of the *Palſie*, or growing well of it, relapſes into danger, the ſame Remedies almoſt are to be inſiſted on. *Whilſt it is* in fieri, *or doing.*

The intentions therefore of healing are, Firſt, That the offices of *Chilification*, and of making of Blood, be rightly performed, and matter for the procreating the Animal Spirits be ſupplied, both laudable and ſufficient to the Head; then, Secondly, That the Brain being ſtill firm and well made, the heterogeneous Particles being excluded, it may admit all that are fitting, and rightly exalt then into Animal Spirits. For theſe ends, I think convenient to propoſe the following method, which ought to be varied, according to the various conſtitutions of the ſick, *The Intentions of healing reſpect the Blood and the Brain.*

In Spring and Fall, that they enter into the ordinary courſe of Phyſick, yea the whole year beſides, ſome Remedis are in conſtant uſe. Blood-letting is not always convenient to all men: But though we forbid this, it is not for the ſame reaſon with

the Ancients, supposing the *Palsie* to be a cold Disease, but because the Animal Spirits, are both procreated out of the Blood, and become also Elastick in the motional Fibres, by reason of the bloody *Copula*; therefore, if plenty of this be taken away, they grow weak and deficient. Which thing indeed I have observed in many, and for the most part languishings and tremblings to have been begun in the Arm, out of which the blood had been taken. However in some, indued with a sharp and hot blood, and apt to flame forth too much, though disposed to the *Palsie*, it is sometimes convenient to let blood a little and sparingly.

Bloodletting.

A Purge.

About the *Æquinox*, a Purge ought to be instituted, and after due times between, to be iterated three or four times. But first, if nothing oppose, let a Vomit be given, of the Salt of *Vitriol*, *Sulphur* of *Antimony*, or an Infusion of *Crocus Metallorum*, or of *Mercurius Vitæ*; then let there be taken Pills of *Amber*, or of *Aloephangina*, by it self, or with the *Resine* of *Jalap*, every seventh or eighth day. At other times we prescribe *Cephalick* Remedies, such as in the sleepy Diseases: *viz. Electuaries*, *Powders*, *Spirits*, and *Volatile Salts*, *Tinctures*, *Elixirs*, with distilled Waters and *Apozems*, sometimes these, sometimes those, or others. Let Issues be made in the Arm or Leg, yea in fat people, and such as are full of ill humors, in both together, or between the shoulders. Let them drink all the year medicated Beer of Sage, Betony, Stechades, Sassafras Wood, and Winterines Bark. Wine and Women ought to be forbidden, or but moderately to be used.

Cephalick Remedies.

2. How the Disease in habit is to be cured.

If that the *Palsie* be excited, after a previous disposition, either of one side, or in some members, and that it still continues, notwithstanding the first attempt of Medicine, a long and complicated method is always requisite, and oftentimes doth not suffice; for not only the Disease, or its conjunct cause, or its foregoing severally, but all together ought to be opposed: for which ends *Phlebotomy* being for the most part interdicted, only a gentle Purge and rarely is convenient. Besides, some chief *Cephalick* Medicines, and *Antiscorbuticks* are wont to help against the foregoing cause of this Disease. But all of this sort, are not convenient to all; yea as we have observed in the Scurvey, according to the various Constitutions of the Sick, there are also Remedies of a diverse kind and virtue. For to *Cholerick Paralyticks*, to wit, in whose sharp and hot Blood there is much of *Salt* and *Sulphur*, and very little of *Serum*, the more hot Medicines and indued with very active Particles, are not agreeable, yea are often hurtful; which things notwithstanding are very profitable to Phlegmatick persons, whose Blood is colder, and contains much of *Serum*, and but few active Elements. Wherefore, for this twofold state or condition of sick persons, it seems convenenient that we institute here a double Method of Cure, and two classes of Medicines, of which these may be given to cold *Parlyticks*, and those to the hot.

Bloodletting and Purging cautiously and rarely to be admitted.

Altering Medicines ought to be given with choice.

How the Palsy is to be healed in a cold temperament.

In the former case, for the taking away the *Procatartick* cause, after Vomiting and Purging being rightly instituted, I was wont to prescribe according to these following forms.

Electuary. Take *of the Conserves of the leaves of the Garden Scurvy-grass, of Rocket, made with an equal part of Sugar, each three ounces; of Ginger Candied in India half an ounce, of the rinds of Oranges and Lemons Candied, each six drams; of the Powder of the Claws and Eyes of Crabs, each four scruples; of the Species of Diambre two drams, of Winterens Bark one dram and a half, of the Roots of Zedoary, the lesser Galingal, of Cubebs, the Seeds of Water-Cresses, Rocket, each one dram; of the Spirits of Scurvy-grass, Lavender, each two drams; of the Syrup of Candied Ginger, what will suffice to make an Electuary. Take of it about the quantity of a Walnut, at eight of the Clock in the Morning, and at five in the Afternoon, drinking after it a pint of*

Coffee. *the following Decoction, warm, or Coffee, with the leaves of Sage boiled in it six ounces, or of Viper Wine three ounces.*

A Decoction. Take *of the shavings of Lignum Sanctum six ounces, of Sarsaparilla, and of Sassaphras, each four ounces; of white and yellow Sanders, of the shavings of Ivory, of Hartshorn, each half an ounce; infuse them according to art, and boil them in sixteen pints of Spring water, till half be consumed, adding of Crude Antimony in Powder, and tyed in a rag four ounces, of the Root of the Aromatick Reed, of the lesser Galingal, each half an ounce; of the Florentine Iris one ounce, of Cardamums six drams, of Coriander Seeds half an ounce, six Dates; make a Decoction to be used for ordinary drink.*

Spirits. Going to sleep, and first in the morning, *let a Dose of the Spirits of Sut, or Hartshorn, or of Armoniacal Amber, or of Blood, &c. be taken, with three ounces of the following distilled water.*

A Distilled water. Take *of the leaves or roots of Aron one pound, of the leaves of Garden Scurvey-grass,*

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of the greater Rocket, of Rosemary, Sage, Savory, Thyme, four handfuls; of the Flowers of Lavender three handfuls, the outer rinds of ten Oranges, and six Lemons, of Winterans Bark three ounces, of the roots of the lesser Galingal, of Calamus Aromaticus, the Florentine Iris, each two ounces; of Cubebs, Cloves, Nutmegs, each two ounces; all being cut and bruised, pour to them of white Wine, and of Brunswick Beer or Mum, each four pints: distil it in common Stills, and let all the liquor be mixed together.

Sometimes in the place of the Electuary may be taken for fifteen or twenty days a Dose of the *Tincture* of *Sulphur* Turpentined, of the *Tincture* of *Antimony*, or of *Amber*: Also sometimes *Elixir Proprietatis*, or of *Pœony*, let them be taken in a spoonful of distilled Water, drinking after it three ounces of the same: Also sometimes the following Powders or Lozenges may be taken by turns, in the medical course. *Tinctures and Elixirs.*

Take *of the Powder of Vipers flesh of Monpillier prepared one ounce, of the hearts and livers of the same half an ounce, of Species Diambre two ounces; make a Powder, take one dram once or twice a day with the distilled Water three ounces, or with Viper Wine, with a Decoction of the leaves of Sage, of the root and seeds of the Burdock, and the Candied roots of Eringo, made of Spring-water, what will suffice, and boiled to one moiety; six or eight ounces in the Morning warm, expecting to sweat after it.*

Take *of Bezoartick Mineral Solar half an ounce, of Cloves powdered two drams; mingle them, make a Powder and divide it into twelve parts, let one be taken after the same manner, twice in a day; between these kind of Remedies, gentle purging may be often used.* *Powders.*

Take *of the Powder of the picked roots of Zedoary, the lesser Galingal, each half a dram; of Species Diambre one dram, of the Powder of the seeds of Mustard, Rocket, Scurvygrass, Water-Cresses, each half a dram; make of them all a fine Powder, add to it of the Oyl of the purest Amber half a dram, and with white Sugar dissolved in the compounded Pœony water, and boiled up to the consistency of Lozenges six ounces: make Lozenges according to art, weighing each half a dram: Eat of them three or four twice in a day, drinking after every Dose, of the liquors before mentioned.* *Lozenges.*

Take *of the Powder of Virginian Snakeweed two drams, of the lesser Galingal one dram, of the gummed extract of the remains of the distillation of the Elixir Vitæ of Quercitan two drams, of the Flowers of Sal Armoniack, (or the most pure Volatile Salt of Snt or Harts-horn) one dram, of the Balsom of Peru one scruple, of the Balsom of* Capivus *what will suffice to make a mass; let it be made into small Pills involved in the Species Diambre. The Dose is half a dram evening or morning.* *Pills.*

Take *of the Resine or Gum of Guaicum three drams, of the Species Diambre one dram, of the Chymical Oyl of Guaicum rightly rectified one dram and a half, of liquid Amber what will suffice to make a mass: let it be formed into Pills, to be taken after the same manner.*

If that the Palsie happens in a Cholerick temper, or to a young Man, it admits only of milder Medicines, and all the more hot things, and *Elastick*, do but imbitter the Disease: The following forms are in use, for the taking away of its foregoing cause. *How the Cholerick or hot Palsie is to be cured.*

Take *of the Conserves of the Flowers of Betony, of Fumitory, of Primroses, each two ounces; of the Species Diambre one dram, of Ivory, Crabs Eyes, and Claws, each four scruples; of the Powder of the Flowers of Pœony two drams, of Lignum Aloes, of yellow Sanders, each one dram; of the Salt of Wormwood one dram and a half, and with the Syrup of the Flowers of Pœony what will suffice, make an Electuary. The Dose is two drams twice in a day, drinking after it, either the simple water of the Flowers of Aron, or of the following Compounded Water three ounces, or of the Decoction of Sage, with the leaves of Tea infused in it four or six ounces.* *An Electuary.*

Take *of the Roots of Aron or Cuckopint, of the male Pœony, Angelica, Imperatoria, each half a pound; of the Flowers of Sage, Rosemary, Marjoram, Brooklime, Water-Cresses, each four handfuls; of the rinds of six Oranges, and four Lemons, of Primroses, Cowslips, Marigold flowers, each three handfuls; let them be all bruised and cut, and pour to them of new Milk six pints, of Malaga Wine one quart; distil them in common Stils, and let the whole liquor be mixed together.* *A Distilled Water.*

Sometimes instead of the Electuary may be taken between whiles, for fourteen or fifteen days, of the Syrup of Steel, of which let one spoonful be taken in three ounces of the distilled Water: It may be made after this manner. *Chalybeats or Steeled Medicines.*

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Take *of the whiteſt Sugar diſſolved in black Cherry Water, and boil'd up to a conſiſtency, eight ounces, adding to it of our Steel in Powder three drams; let them be ſtirred together over the fire, and then by degrees pour to it of the Water of Roſemary warm twelve ounces; let it boil gently for a quarter of an hour, ſcumming it, and pouring it forth warm thorow an hair ſieve or ſtrainer.*

There may be alſo made ſteeled Lozenges after this manner, to wit, with Sugar ſufficiently boiled with Steel, adding of the Chymical Oyl of Amber or of Roſemary half a dram, and preſently let it be poured forth that it may flow into a conſiſtency of Lozenges: The Doſe is two drams twice in a day, drinking after it of diſtilled Water, or of the following Apozem ſix ounces.

A Decoction. Take *of China Root one ounce, of the ſhavings of Ivory, Harts-horn, each half an ounce; of white and yellow Sanders, of the Wood of the Maſtick-tree, each half an ounce; let them be infuſed in warm water and cloſe ſtopt for a whole night, ſix pints; in the morning add to them of the Roots of Chervil, of ſweet ſmelling Avens, of Broom, and Parſley, each one ounce and a half; of the dryed leaves of ground Ivy, Sage, Germander, Betony, each one handful, of Coriander ſeeds three drams; let them be boiled till half is conſumed, then add to it of white Wine half a pint, and ſtrain it into a jugg, upon the leaves of Water-Creſſes bruiſed two handful: Let it infuſe warm and cloſe ſhut, for two hours, ſtrain it again, and keep it in a cloſe Veſſel well ſtopt.*

In the Scorbutick *Palſie*, the Juices and expreſſions of Herbs, do often bring notable help.

The juice and expreſſions of Herbs. Take *of the leaves of Brooklime, Water-Creſſes, and Plantan freſh gathered, each four handfuls, bruiſe them together, and pour to them of the diſtilled Water but now deſcribed eight ounces, ſqueeſe the juice ſtrongly forth, and keep it in a glaſs, and take of it twice or thrice in a day three or four ounces.*

At the extream Phyſical hours, *viz.* Morning and Evening, may be taken theſe following Pills.

Pills. Take *of Millipedes prepared three drams and a half, of Pearls one dram and a half, of the Root of the Cretick Dittany one dram, Venice Turpentine what will ſuffice to make a maſs: let it be formed into ſmall Pills, the Doſe is half a dram, drinking after it a draught of the diſtilled Water.*

For ordinary drink, let there be preſcribed, either a Bochet of Sarſe, China, yellow Sanders, *&c.* or ſmall Ale, with the dryed leaves of ground Ivy, boiled in it; and of Sage, with the Wood of Saſſafras, infuſed therein.

2. Whilſt theſe things are doing, for the taking away the foregoing cauſe of the Diſeaſe, there is no leſs a curatory care required, for its conjunct cauſe; to wit, that all obſtructed places being opened, they might admit the Animal Spirits, free from ſtupefaction, and that they may paſs freely thorow.

Topick and particular Remedies. There are two chief kinds of Remedies, which conduce to thoſe ends, *viz.* one particular and private, to be applied to the diſtemper'd places: to wit, that by Fomentations, Oyntments, Plaſters, and ſuch like outward applications, the ſleepy Spirits might be awakned, and their paſſages opened: the other univerſal, to wit, that the Blood and Spirits, and the other humors (and the active Particles flowing in the whole Body) being very much agitated, and put into a rapid motion, like a torrent, they might caſt down and remove all impacted heaps or ſtays, by which the Spirits are obſtructed.

The adminiſtrations uſed to the diſtempered parts are ſo ordinarily and commonly known, that it were ſuperfluous to inſiſt here on the deſcribing them more largely. Firſt *Liniments*, made out of Oyls, Oyntments, and Balſoms, are to be applied according to the temper of the Patient, more or leſs hot, and with frictions or ſtrong rubbing twice a day. Sometimes, before theſe are made uſe of, Fomentations made of *Cephalick* Herbs, or ſpices boiled in Spring Water, adding to it ſometimes Strong Waters, Wine, or Bear or their Lees. Further, oftentimes it is convenient to make about the diſtemper'd places Bliſters, and to uſe Cupping-glaſſes, and Medicines to take away the hairs, and to raiſe pimples. Little Bags and Plaſters often help. Moreover, if the buſineſs will admit it, let the *Paralytick* members be covered over with

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hot grains, or with the refuſe of the Grapes when flung out of the Wine-preſs; or let them be thruſt into the belly of a Beaſt new ſlain, or bathed in an artificial Bath, or in the natural Baths, and be kept for a long while in any of theſe.

But if theſe help not, you muſt then come to univerſal Remedies, or great Remedies; of which ſort, in the firſt place, are *Diaphoreticks* or ſweating Medicines, *Mercurial* Medicines ſtirring up Salivation; and ſtrong Vomiting Medicines: of each of which we ſhall ſpeak briefly. *Univerſal Remedies.*

In the Cure of the *Palſie*, ſometimes *Diaphoreticks*, or Medicines cauſing ſweats, do very much help; and that they ſometimes are hurtful, the common people do ordinarily obſerve. Wherefore it is very requiſite, that we ſhould unfold the reaſons of this ſo different effect; and that ſo indications may be taken as to the uſe or rejection of them. *1. Diaphoreticks.*

Therefore, a plentiful ſweating is wont to be helpful ſometimes to *Paralyticks*, chiefly for two reaſons; to wit, for that it doth thruſt forth or exterminate in a great meaſure the impurities of the Blood, and the nervous juice, being apt to breath forth; ſo that the Morbific matter doth not flow any more to the Brain, and the diſtemper'd parts; and that whatever hath already flowed forth from them, is partly conveyed forth of doors. Then, Secondly, Becauſe the Effluvia's of heat falling away from the boiling blood, do very much open the nervous Paſſages before obſtructed, whilſt in evaporating they paſs thorow them, and make an open way for the Spirits. Wherefore this adminiſtration is chiefly and almoſt only convenient for thoſe, whoſe Blood is not ſtuffed with fixed Salt and Sulphur, but is diluted with a limpid and ſaltleſs Serum. For on the contrary, *Paralyticks* whoſe blood and humors are full of fierce, Exotick, and fixed Particles of enormous Salts and Sulphur, and unfit to be exhaled, do often receive great harm by a violent and forced ſweating. Of this kind of effect we have aſſigned theſe two cauſes, to wit, becauſe that the Morbific Particles, by reaſon of agitation being too much exalted, become more outragious; then ſecondly, becauſe theſe being more plentifully brought to the Brain and nervous Stock, they oftentimes increaſe the old obſtructions, and not rarely produce new. *They are not to be adminiſtred indifferently to all.* *They often hurt the Cholerick.*

That a plentiful ſweating or *Diaphoreſis* may be eaſily provoked, both internal Medicines, and outward adminiſtrations are wont to be made uſe of. The former ſtir up either the Blood or Serum into an heat, or provoke the heart into more ſwift motions; and for that cauſe (whether one or both be done) when the bloody liquor is rapidly circulated thorow the Heart and Veſſels, and is wrought into a frothy ſwelling up, there is a neceſſity, that very many Effluvia's, which are the matter of ſweat, ſhould go away from it. For this end, Medicines of a various kind are commended to *Paralyticks*, of which the moſt noted are, a Decoction of *Guaicum*, *Sarſaparilla*, *&c.* Spirits and Oyl of *Guaicum*, the ſimple mixture, Flowers and Spirits of *Sal Armoniack*, *Aurum Diaphoreticum*, the Salt of *Vipers*, as alſo the Powder and Wine of the ſame: the ſolar *Bezoartick minerale*, Tincture of *Antimony*, *&c.* *Sweating Medicines.*

External adminiſtrations move ſweat, becauſe they hold in, and ſtir up the moderate heat in the whole body; and ſo the blood being made hot, is compelled to move more ſwiftly, and to evaporate more, and at the ſame time, the Pores of the skin, being unlocked, readily let forth all the Particles that are apt to exhale. For this uſe, beſides the Bed-cloaths (which only hold in the Effluvia's of heat ſent from the body, about it ſtill) there are little ſweating Chairs, or Stoves, made hot with Coals or with the Spirits of Wine; alſo Hot-houſes and Baths of various kinds and forms, and our natural Baths, are wont to be made uſe of: But of all of them, our natural Baths of the *Bath* (if they agree with the temper of the ſick) are thought to be the beſt Remedy; which the many Crutches, hung up as ſo many trophies of this Diſeaſe being overcome, belonging to many Cured of the Palſie, do ſufficiently ſhew. *Stoves, Baths, Natural Baths.*

But as the beſt Medicines, if they prove not a Remedy to the Diſeaſe, often paſs into poiſons; ſo the uſe of *Baths*, when it cures not ſome *Paralyticks*, renders them much worſe; ſo that when as the ſick had before many members diſtemper'd and reſolved or looſened, there was no other occaſion for them of leaving behind them there their Crutches, unleſs it were becauſe they could uſe them no longer. We have above ſhewed the cauſe of this; to wit, becauſe bathing, ſhaking, or moving the blood, and all the humors, more exalts all the Morbific and extraneous particles, and they becoming more outragious, drives them from the Viſcera into the bloody maſs; from whence (when they cannot eaſily evaporate) entring into the Brain and nervous Stock, increaſe the *Paralytick* Diſtemper, and very often adds to it the Convulſive. For this reaſon Bathing ſometimes actuates or ſtirs up the *Nephritick*, and the Gouty diſpoſition; and further, in many where there was not a diſpoſition, it cauſes a ſpitting of blood, the *Aſthma*, or Conſumption. Wherefore Baths ought not to be tryed *When the uſe of Baths is hurtful in the Palſie.*

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without the advice of a *Phyſician*, and then having tryed them, if they ſeem not agreeable, they are to be ſoon left.

Salivation. I have by my own experience ſufficiently try'd, and known alſo by that of ſeveral other *Phyſicians*, that ſome *Paralyticks* have been cured by Salivation excited by *Mercury*. But I think this kind of Remedy, is only to be uſed to the habitual *Palſie*, to wit, which hath its foregoing cauſe in the Blood and Brain, eaſily moveable, and its conjunct cauſe, in the nervous appendix, not very fixed. But when this Diſtemper is cauſed from an outward and great hurt, or follows upon the *Carus*, *Apoplexy*, or *Convulſions*, a Salivation or ſpitting is attempted in vain, and ſometimes not without great hurt. But whoever are indued with a weak and too looſe a Brain, and are obnoxious to frequent Convulſive motions, are not raſhly to make uſe of *Mercury*. Yet ſometimes a Salivation in an habitual *Palſie*, and not very fixed, hath highly profited, foraſmuch as by taking away the impurities of the blood, it cuts off all the nouriſhment of the Diſeaſe; alſo, becauſe ſome *Mercurial* Particles, whilſt paſſing thorow the Brain, and entring the nervous paſſages, divide the Morbific matter impacted in them, and drawing its parts one from another, variouſly diſperſe ſome forward, and others backwards; when oftentimes it is the fault of other Medicines, that they only urge forward the heap obſtructing the ways of the Spirits, ſo that if they pull it not to pieces, they drive it more firmly into the obſtructed places.

Vomitories. In ſome meaſure it is for this reaſon alſo, that Vomits do frequently yield notable help in the Cure of the *Palſie*, to wit, becauſe they draw away the nouriſhment of the conjunct cauſe, yea and do not always drive forward, but pull back the matter impacted in the Nerves, do greatly ſhake, and often break it in bits; ſo that when the continuity of the heap is broken, the Animal Spirits themſelves eaſily diſſipate the Particles of the Morbific matter, looſened one from another. We have before mentioned another reaſon of the help of *Emeticks* in the Sleepy Diſeaſe, which alſo may have a place in the *Palſie*.

Hiſtories and Examples of Paralyticks. Inſtances and examples of *Paralyticks* are ſo ordinarily and almoſt daily met with, that their various Types and Hiſtories would fill a Volume, if they ſhould be deſcribed. Wherefore I ſhall only add here ſome few and more rare ones, to wit, one or two, by which the chief kinds of this Diſeaſe may be illuſtrated. For as it will be little to the purpoſe, to deſcribe the reſolutions of members, excited by outward accident, as from a fall, wound, or ſtroke; I ſhall inſiſt only on thoſe caſes, where the *Palſie* either ariſes by its ſelf, after a previous diſpoſition, or comes upon ſome other Diſeaſe.

The Example of the Palſie habitual excited of it ſelf. The firſt Hiſtory. Some time ſince, a certain Gentleman, ſtrong, and well fleſh'd, and beyond the tenth luſtre of his age, almoſt ever healthful; at length being given to a ſedentary and idle life, and from thence becoming more dull and heavy than uſual, refuſed any exerciſe, and more hard motion of the body: moreover he was wont to be melancholick and ſad, upon any light occaſion, yea ſometimes to break forth into weeping and tears, without any manifeſt occaſion. This man a little after (which I alſo obſerved in many others) was diſtemper'd with an imbecillity and trembling of all his members, and then with a reſolution of the lower parts; to which Diſeaſe (for that he was melancholick, and ſoon weary of Medicines) he gave himſelf up as overcome, and by degrees being made more weak and languiſhing, he dyed within ſix months.

I remember many others, but eſpecially two committed to our Cure, who were highly ingenious and very learned, in the former part of their life; but afterwards in their declining age, partly through the evil diſpoſition of the body, and partly through the perturbation of the mind, became dull and forgetful, and after that (notwithſtanding the uſe of the Remedies in the beginning of the Diſeaſe) *Paralytick*.

The Reaſon of it. In theſe kind of caſes, firſt the Brain it ſelf, as to its temper and make, ſeems to be ſo weakened, that the Spirits inhabiting it, becoming torpid, and wandring out of their tracts, did not rightly perform the acts of Memory and Imagination; then by reaſon of their failure and diſorders in their firſt ſpring or fount, (which are not enough taken notice of till they become uncureable) there is a neceſſity, that an impotency or an eclipſe of the motive faculty, ſhould ſucceed in the nervous appendix. But the Cure of theſe Diſtempers, as often as they are excited from ſuch an occaſion, is ever very difficult, becauſe the antecedent cauſe is hardly or ſcarce ever taken away.

The ſecond Hiſtory more rare and notable. A young man, of a Sanguine temper, ingenious, and for the moſt part healthy, ſitting in a Chair after a large ſupper, and immoderate drinking of Wine, was ſo diſtemper'd with a numneſs or ſtupidity in his right hand, that his Gloves which he held in it, fell of themſelves out of his hand; then getting up, and endeavouring to walk, he felt a reſolution or looſening in his Thigh and Leg of the ſame ſide, and a little

a little afterwards falling into a certain hebetude or dulneſs of mind, and ſtupefaction, yet without an *Apoplexy*; for he was ſtill himſelf, anſwering aptly to queſtions asked him, though but ſlowly and with difficulty, and doing thoſe things that were bid him. Preſently a skilful *Phyſician* being ſent for, *Phlebotomy*, Vomiting, and Purging, were celebrated in order, Cupping-Glaſſes, Scarification, Oyntments, Frictions, and other fit adminiſtrations were carefully applied: Nevertheleſs the *Palſie* increaſed, that beſides the motion of his members on the right ſide being taken away, he alſo loſt the ſight of that eye; yet ſtill being ſtupefied and ſleepy, he was *compos mentis*, and knew his Friends, and being conſcious of his infirmity, and ſolicitous for the recovering his health, he took all remedies were given him; but notwithſtanding all this, the animal functions daily more and more languiſhed, and at length by their conſent the vital; ſo that about the ſeventh or the eighth day, from thence, falling ſometimes into a Delirium, and ſometimes into Convulſions, or other diſtractions of the Animal Spirits, his ſtrength being at length quite loſt, he yielded to Death.

An Anatomica Obſervation, by which the Caſe is explained.

His Head being opened, the anterior cavity of the Brain was filled, partly with Ichorous Blood, partly concreted and in clodders or gobbets, with plenty of Serum: Hence, as it is eaſie to conceive, from this deluge, preſſing upon one of the Streaked bodies, and binding up its Pores and Paſſages, the flowing of the Spirits into the nervous appendix of that ſide was hindred, and for that reaſon, the reſolution in the reſpective members was excited; and becauſe of the *optick* chamber, where it is inſerted into the Streaked Body, being alſo preſſed together, the Eye of that ſide loſt its ſight; further, becauſe the *Callous* Body, chambring that den, was ſomewhat preſſed by the heaped matter, from thence the hebetude and ſtupefaction of the chief functions of the ſoul were excited, yet without their ſubverſion or inordination. By reaſon of the evil being fixed on the ſubſtance of the Brain, and the Spirits inhabiting it, theſe ſorts of Diſtempers do proceed, and not from the impletion of the Ventricle, as appears clear enough by this inſtance, and by what we have elſewhere mentioned.

The third Hiſtory.

A Servant to a certain Nobleman, being about forty years of Age, indued with a ſharp Blood, and Cholerick temperament, and for ſome time obnoxious to the *Vertigo*, whilſt he was riding in the Country to a certain Village, being taken ſuddenly with a dizzineſs in the Head, he fell upon the ground headlong, and being inſtantly taken up by the inhabitants, and put to bed, he lay for many hours inſenſible, and as if dead. But afterward being awakened, he felt an univerſal *Palſie*, and all his members looſened on both ſides. Viſiting this Man the day after, I took from him preſently about twelve ounces of Blood, and preſcribed forthwith ſome other Remedies, both outward adminiſtrations and alſo inward Medicines to be carefully given him, and indeed with good ſucceſs; for after five or ſix days, he began to bend and ſtretch forth his hands, and feet, yea, though ſlowly, to move them about hither and thither; then by the conſtant uſe of Remedies, within two months, he was able to riſe up, to ſtand on his feet, and to walk a little with the help of Crutches; then uſing at home for ſome time daily a temperate artificial Bath, he got ſtrength and motion by degrees in his members; at length as ſoon as the ſeaſon of the year ſerved, going to the *Bath*, within a fortnights time, by the uſe of the Baths, he grew perfectly well, and leaving his Crutches behind him returned whole.

The Reaſon of this.

In this caſe, the *Apoplectick* matter falling down out of the middle of the Brain, being divided and largely poured forth, entered both the Streaked Bodies, and ſo cauſed the univerſal *Palſie*; but foraſmuch as being more ſtretched abroad, the ſame was the leſs thickly impacted in the Marrowy Pores, therefore being more moveable, and apt to be ſhaken off, it did admit ſo eaſie and quick a Cure. To this man the more hot Remedies were not agreeable, ſo that I was compelled ſometimes to iterate *Phlebotomy*, and to give him only temperate Medicines. That the *Palſie* doth ſometimes ſucceed, not only *Cephalick* Diſtempers, but alſo the *Colick*, and *Scurvey*, (as we have already hinted) the following Hiſtory, (of which we have ſomewhere made mention as to its *Scorbutick* reaſon,) will manifeſtly declare.

The fourth Hiſtory.

A young and handſome Woman, after being brought to bed, fell into a Tertian *Feavour*, this coming at length daily upon her, and protracted, brought in a moſt cruel and continual *Colick*. The pains at firſt tormented her only in her Belly, with vomiting and moſt ſharp torments. Being a long while vexed with theſe, and almoſt worn out; at length ſhe began to be moleſted with a ſtupefaction, and a ſenſe of tingling, ſuch as comes upon a member laid upon. Nor was it long after that but a *Palſie* (which this other Diſtemper very often foreruns) follow'd in her whole Body. In this condition being brought to *Oxford*, ſhe was committed to our Cure (the noted *Phyſician* Dr. *Lydell* being alſo called to our aſſiſtance.) In this ſick Gentlewoman, not only all her greater Members, as her Arms and Legs, but almoſt every

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leſſer joynt or limb, was almoſt wholly looſened, that ſhe could not move hand nor foot, or the fingers or toes of either. Further, ſhe was ſo diſtemper'd with a waſting away, that ſhe was nothing but skin and bones, however (and from which only we had any hopes) ſhe had a good Pulſe, and a lively aſpect.

The Cure expoſed. After we had adminiſter'd to her for many weeks, moſt choice Medicines, both *Antiparalytick* and *Antiſcorbutick*, almoſt of every kind, and according to the various methods, without any ſucceſs; at length we propoſed to her, and to her Friends, *Salivation*, as the moſt powerful, though alſo moſt dangerous of all other Remedies; they not long deliberating upon it, reſolve to try a Medicine rather doubtful than none, and though the ſame ſhould be wholly inefficacious. Therefore by God's help, we gave her in a ſmall Doſe, precipitate of *Mercury cum ſole*, and the next day repeated it. On the third day, a moderate and eaſie Salivation beginning, gently ſucceeded for a week, without any malignant *ſymptom*; but then the ſick complaining of a grievous Headach, and *Vertigo*, began to be afflicted with Convulſive motions; ſo that there was a neceſſity to let her lye down, and depreſs the Salivation, and as ſoon as we could, to break off this courſe, by the Serous Flux of water being called away from the Head, to the other parts; which indeed Clyſters, frequently given, *Epiſpatick* or drawing and revulſive Plaſters, applied to ſeveral places, together with Cordials and Opiates inwardly given her, did quickly effect; and then preſently this Gentlewoman finding her ſelf a little better, began to ſtretch forth and bend her fingers and toes, and ſometimes to move her members from one place to another. Her ſpitting ceaſing, being gently purged, ſhe took for many days a Decoction of *China*, *Sarſa*, *Saunders*, *Ivory*, *&c.* with the addition of the dried leaves of Betony, Sage, female Betony, *&c.* and between whiles with that, Spirits of Hartshorn, or of Sut, *Cephalick* and *Cardiack* Confections, alſo Powders and proper *Juleps*. Within a months ſpace, being held up by her Servants, ſhe could ſtand on her feet, and walk a little in her Chamber; moreover, ſleeping and eating moderately, ſhe every day got fleſh and ſtrength, and at length by the uſe of the temperate Bathes at the *Bath*, ſhe grew well.

The Reaſon of it. The reaſon of the aforeſaid caſe ſeems to be after this manner: Firſt, the vitious blood had contracted an intermitting Feavour, then by reaſon of the long ſtay of that Feavour, the ſame being made more vitious, did alſo impart its evil to the Brain and nervous Stock; the matter being poured forth from the blood on them, together with the nervous juice, being only at firſt *Spaſmodick* or Convulſive, and entering much into the *Intercoſtal* Nerves, excited the *Colick*; but then, that being more largely poured forth into the Nerves of the *ſpinal* Marrow, brought on painful contractions in the nervous Fibres, in almoſt the whole habit of the Body; and when from the aſſiduous and plentiful incourſe of the Convulſive matter, the paſſages of the Brain and Nerves being very much unlock'd, became very open; at length the more thick and *vitriolick* Particles entering with them, diſſeminated the *Paralytick* Diſtemper thorow the whole Body. Concerning its Cure, the Remedies uſed before Salivation did not profit, becauſe they urging this Morbific matter ſtill forward, drove it more deeply and cloſely into the nervous paſſages; but the *mercurial* Particles, becauſe they diſſolved the matter ſo compacted, firſt opened the way of Cure, which afterwards being much helped daily by *Cephalick* Medicines, it was at length conſummated by the uſe of the Baths.

The fifth Hiſtory, ſhewing when the Baths are hurtful. But that Baths are not profitable to all *Paralyticks*, yea (as we ſaid above) very hurtful to ſome, this following Hiſtory (whoſe mournful *cataſtrophe* happened whilſt we were writing theſe) will manifeſtly declare. A Merchant of *London* having put his foot out of joint, became upon it lame in that part, but as to all things elſe he was ſound and ſtrong enough; when he had tried for ſome time ſeveral kinds of *Topick* Remedies, and they effecting nothing; at length, by the counſel of a *Phyſician*, going to the *Bath*, he began to try the temperate Baths, by the uſe of which growing preſently worſe, and beginning immediately to have a Palſie in his other Members, he had abſtained from them, but that the *Phyſician*, then preſent, promiſing him that he ſhould afterwards be better, exhorted him to perſiſt; wherefore he again enter'd into the Bath, for about thirty days, until at length all his lower members, to wit, from the *Os ſacrum* to his Feet, being wholly looſened, withered away; beſides in his Breaſt was excited a very great difficulty of breathing, and as it were *Aſthmatical*: For that his breaſt was not able to be dilated ſufficiently, by introducing the breath deeply, the Muſcles dedicated to reſpiration being as it ſeems alſo affected with the *Palſie*; wherefore growing ſhort-winded, he laboured with a continual endeavour of thoſe parts, and with an agitation of the whole *Thorax*. In this condition leaving the *Bath*, he was bid by his *Phyſician*, to abſtain for a whole month from any Remedies taken

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from Medicine; which when he had ſtrictly obſerved, out of hope to grow well again, that time being elapſed, it was then too late to deliberate on the uſe of any Medicines; for beſides his *Paralytick* and withered members, his belly ſwell'd, his breathing was yet more hard and troubleſome, that he could now ſcarely draw breath: His Pulſe was very weak, and upon any motion of his Body, he had frequent ſwoonings away, and loſs of Spirits: Hence, as there was ſcarce any place left for purging, Cordials and Antiparalytick Remedies were only to be inſiſted on, but notwithſtanding the uſe of which, this ſick man, within a fortnights time, labouring for many hours under a *Dyſpnoe* or want of breath, at length expired. The immediate cauſe of whoſe Death I ſuſpect to have been the manifold concretions of the blood in the Heart; for when the motion of the *Præcordia* for a long time was very much hindred, there ſeems nothing more probable, than that theſe kind of gobbets as it were fleſhy, ſhould increaſe within the Ventricles of the Heart.

For the illuſtrating of the *Theory* of the *Palſie*, a little more, and alſo of the *Lethargy* and *Carus*, I ſhall add this other example, with *Anatomical* obſervations; which happened whilſt the former were in the Preſs.

An Example of the Palſie from a Lethargy.

A little one a little above three years old, of a moiſt or humid Brain, as appeared by moſt grievous ſore Eyes, and the watry whelks or puſtles of the face, to which it was ſometimes obnoxious; falling ill about the beginning of *Autumn*, with a ſlow Feavour, and loſt Appetite, it became very torpid and ſleepy, ſo that it would ſleep almoſt continually day and night; but being awake, he knew thoſe ſtanding about him, and anſwered very aptly to their Queſtions. To this Child, fit Remedies being preſently and diligently given, *viz.* Clyſters, Bliſtering Plaſters, Purges, alſo Juleps, Spirits of Harts-horn, Powders, with many others uſed in theſe caſes, they prevailed ſo much, that within ſix or ſeven days the ſick Child being free from its Feavour, waking enough, and deſiring Food, ſeemed to grow well, and to have ſcarce any more need of a *Phyſician*: But in a ſhort time after (by what occaſion uncertain) falling into a relapſe, and again ſleepy, was preſently ſeiſed with a moſt grievous ſtupefaction, ſo that it was hardly to be awakened, and ſcarce knew any one, or what it did it ſelf; the next day being plainly ſtupid, though being ſtrongly pulled, it did open its Eyes, it would roll them about hither and thither, and ſaw nothing; but within a day or two, a *Palſie* follow'd in its whole right ſide. The former Remedies were repeated, and beſides ſneezing Medicines, chawing Medicines to draw down Rheum by the mouth, a taking away of Blood, with Poultiſſes applied to the Feet, and all its Head being ſhaven, drawing Plaſters were put all over its Head, with other Medicines, and ways of adminiſtrations preſcribed in order, nothing profited, but that this ſick Child, after its lying ſo inſenſible for four or five days, at length its breath and Pulſe failing, dyed.

Its dead Body being opened, we found almoſt all things ſound enough in the lower and middle bellies, (*i. e.* in the Belly and Breaſt) unleſs that in the right Kidney, a whitiſh mattery Humor, or as it were a thin Corruption, had begun to be heaped together, which plentifully flowed forth out of ſome parts of the Kidney being diſſected and ſqueezed together: This did ſeem to have been the beginning, or a certain rudiment of a future Impoſthum, and perhaps by reaſon of the Serum not ſufficiently ſeparated here, its greater plenty had flowed to the Brain.

For the top of the Skull being taken away, the anterior region of the Head, almoſt to the inſertion of the fourth boſom, ſwelled up, being covered with clear water, ſhining thorow the Membranes, which preſently flowed forth, when the *Meninges* were diſſected: Further, in this place, portions of the Brain being by pieces cut off, appeared too wet, and without any red or bloody pricks: but in the hinder border of the Brain the Veſſels were red with blood, and the *Cortical* ſubſtance appeared without tumor, or deluge of water, more cloſe and firm: From theſe (as we have affirmed before) it manifeſtly appeared, that the cauſe of the *Lethargy* did depend upon the watry flood, or as it were *Anaſarca* or Dropſie of the outward part of the Brain.

The Brain being cut piece-meal, and an hole made in the anterior cavity, diſtended by the water, the clear water being before as it were penned up, within a more narrow ſpace, leaped forth, a great plenty of which had filled all the Ventricles to the top, and (as it ſeems) by compreſſing the *Optick* chambers, (as in the other caſe above deſcribed) brought in blindneſs, and by entring or preſſing together one of the Streaked Bodies, or its Pores, cauſed the *Palſie*.

The *Choroeidal* Infoldings appeared as it were half boiled, whitiſh, and almoſt without blood. It is probable, that the water did flow forth of theſe Veſſels, by which the Ventricles of the Brain were overflown, all, or at leaſt the greateſt part

of it; although in this caſe, if (as ſome think) the watry *Latex* or Humor ſliding down lower from the ſhelly part of the Brain, the Brain being at length thorowly paſſed thorow, did rain down into theſe boſoms, we may from thence aptly fetch a reaſon, wherefore the *Lethargy* at firſt thought to be cured, returned afterwards more cruel, accompanied with blindneſs and the *Palſie*; to wit, becauſe at firſt the ſtock of the ſleepy matter falling down, from the ſhelly part of the Brain, into its cavity, the animal function was a little cleared; but afterwards, when new matter ſprung up in the *Cortex* of the Brain, and this ſliding forward into its boſom, was heaped up to a fulneſs, for that reaſon happened the relapſe of the former Diſeaſe, with thoſe companions of blindneſs and the *Palſie*.

But although the Dropſie of the interior Brain, or the inundation of its Ventricles, by compreſſing either the Streaked Bodies, or the *optick* chambers, raiſed up the *Palſie* or blindneſs, or by pulling the beginnings of the Nerves, the Convulſive Diſtempers; yet it appears moſt evidently by our late *Anatomical* obſervation, that the *Lethargy* did not ariſe from any ſuch cauſe, but only from the exterior part of the Brain being overflowed, or preſſed together.

A certain Gentleman a long time unhealthy, after he had laboured almoſt for five months with the *Colick*, or rather with a wandring *Scorbutical* Gout, in which not only the Viſcera and Loins were troubled with great torments; but moreover the Membranes and Muſcles of the whole Body, were almoſt continually tormented; and at length he ſuffered ſometimes moſt horrid Convulſions in his Members, ſometimes reſolutions, and ſometimes a Phrenſie in his Head, and ſometimes as it were *Apoplectical* fits, or a darkneſs in his Eyes, ſo that being worn out, his ſtrength and ſpirits wholly exhauſted, he dyed. Almoſt ſeven days (except the laſt but one) before he dyed, being more ſtrong as to his Senſe and Intellect, he lived almoſt perpetually without ſleep; though gentle or the more ſtrong *Opiates* were given him, yet he could not ſleep at all. A little before this waking, from a *Veſicatory* applied to the hinder part of his Neck, an immenſe quantity of water flowed; and from that time even till he dyed, it ſtill flowed forth; hence, as I ſuſpect, he became ſo waking by reaſon of the watry humor being ſo greatly drawn away from the Brain.

The head of this dead Man being opened, the interior cavities of the Brain, or all the Ventricles being filled to the top with clear water, appeared as if they were diſtended; yea the medullary cord it ſelf, about the top of the Back-bone, ſeemed to be drowned and compaſſed about with water laid up there. Without doubt, for this reaſon, the Pains and Convulſions ſo cruelly tormented him in his Loins, Members, and all over his Body; and by reaſon of the deluge in the Ventricles, he became obnoxious to blindneſs of his ſight, and to frequent looſenings of his limbs: Nevertheleſs, hence no *Lethargy*, but a waking was induced, by reaſon of the waters being ſo much derived from the compaſs of the Brain by the Bliſtering Plaſters. He had alſo a Dropſie in his Breaſt, by reaſon of his Lungs being much vitiated. His Liver appeared of a mighty bulk, beſprinkled every where with white ſpots, and almoſt without blood: ſo that to theſe faults of the *Viſcera*, the vices of the Blood and nervous juice ought in ſome meaſure to be aſcribed.

CHAP.

CHAP. X.

Of the Delirium and Phrenſie.

THUS much concerning *Cephalick* Diſeaſes, by which the Animal Functions by themſelves, and as they are Corporeal, without any reſpect to the Animal Soul, are wont to be hindred or perverted: In ſome of which, *viz.* the *Vertigo* and *Palſie*, the Intellect for the moſt part remains clear and lively, and in the reſt, like the eye placed in an obſcure place, it beholds the ſpecies, either not at all, or a few objects only of a more rude appearance, but is not eaſily ſnatched into any great error or fury; which kind of *ſymptoms* are ordinarily induced by reaſon of other Diſtempers of the Head, and of the Spirits inhabiting it, of which we are now about to treat. For if at any time the Imagination is ſo diſturbed, or perverted, that it falſly conceives, or evilly compoſes or divides, the ſpecies and notions brought from the Senſe or Memory; preſently for that reaſon the intellect beholds or forms conceptions and thoughts only deformed, diſtracted one from another, and very confuſed: Which indeed are repreſented to it from the Brain evilly affected, and as it were monſters from a multiplying or diſtorted Glaſs. As there are many ways, by which the Imagination, and by conſequence the mind and will, and the other powers of the ſuperior ſoul, are wont to be perverted or depraved, all of them are noted by the common word Fooliſhneſs, or talking idly. But this Diſtemper is diſtinguiſhed into ſhorter, which is called a *Delirium*; and into a longer or continual; which is either conjoined with a Feavour, and termed *Phrenſie*; or it happens without a Feavour, and then their is joyned with it, either raving, ſadneſs, or ſtupidity, and ſo it is divided into madneſs, melancholy, and moroſity or fooliſhneſs: we ſhall ſpeak of each of theſe in order; and firſt of the *Delirium* and *Phrenſie*.

The Diſtempers of the Brain follow, in which Reaſon is hurt as well as the other Animal Functions.

Who are ſaid to be Fooliſh, or to talk idly.

This is either ſhorter, as the Delirium; or longer, and with a Feavour, & called Phrenſie; or without a Feavour, as melancholy, madneſs, ſtupidity.

Although the *Delirium* is not a Diſeaſe of it ſelf, but only a *ſymptom* proceeding from other Diſtempers, yet becauſe it happens in ſome of them, that for the moſt part it is cured by Remedies appropriate to it, therefore it will not be amiſs for us to inquire a little more ſtrictly into the cauſes and nature of it. This word taken after an eſpecial manner, is the ſame with παραφροσύνη, or a going crooked, or out of the right or ſtraight way, and denotes an hurt of the ſame Animal Function ſuch as ariſeth in fits of the Feavour, Drunkenneſs, and ſometimes in the paſſions called *Hyſterical*, and induces men for a ſhort time to think, ſpeak, or do abſurd things, either ſome of theſe, or all of them together.

What the Delirium is.

The *Delirium* is excited, foraſmuch as the Animal Spirits being either too much irritated, or acted into confuſion, are carried tumultuouſly into diſorders hither and thither, within the globous compaſs of the Brain, where the *Phantaſie* and *Memory* have their ſeats; and ſo whilſt the various images of the imagination and the memory being excited at once, are confounded together, they object only incongruous and abſurd *phantaſies* to the rational Soul, and ſo both the acts of the intellect and the will, are only inordinately choſen or drawn forth. In like manner it happens, by reaſon that the Animal Spirits being moved, within the middle of the Brain or the *Callous* Body, that incongruous conceptions, and confuſed thoughts, are objected to the rational Soul; as in a long circumgyration or turning about of the body, the images of viſible things are carried to the common ſenſe, whence all things ſeem to be turned about, and ſometimes to be lifted up, and ſometimes to be depreſſed to the ground; that nothing is beheld ſtable or ſtanding in its due place, and poſition. In a Brain rightly diſpoſed, the motion of the Animal Spirits are performed, as it were in certain numbers, ways and meaſures; whilſt ſome Spirits are raiſed up in theſe tracts, others lye ſtill in thoſe, and ſo they ſucceed one another in their motions; and the ſeveral acts of every faculty are made diſtinct, like ſo many wavings of water in a River; but in the *Delirium*, all the Spirits leap forth at once, and meeting one another tumultuouſly, or variouſly laying hold on one another, are agitated like mad *Bacchanals*. Further, even as theſe being ſtruck with ſuch a fury within the compaſs of the Brain, do ſtir up manifold and very much diſturbed cogitations; ſo whilſt they are carried without its confines into the nervous original, they produce incongruous ſpeeches, abſurd geſtures of the body, and members, and not rarely Convulſive motions. But for that ſuch a rage of the ſpirits, (otherways than in the *Phrenſie* or *Madneſs*) preſently grows cool, and their tumult being over, none of their wandring tracts are imprinted in the Brain, the *Delirium* ſoon paſſes

Its formal Reaſon.

over, and the diſtemper'd come immediately to themſelves again, without any marks left of their fooliſhneſs or idle raving.

The Cauſes of the Delirium.

If it be demanded, from whence this ſhort fury is impreſſed on the ſpirits, inhabiting the Brain, that the Reins of the mind being ſhaken off, they turn thus all things upſide down in their government; we ſay, that they conceive this kind of inordination, from a twofold reaſon; to wit, this rage or madneſs is brought immediately to them, from the blood waſhing the frame of the Brain; or ſome Animal Spirits, outwardly dwelling in the nervous Stock, enter firſt of all into ſome diſorder; then the ſame being communicated by the nervous paſſages, affecting in like manner the ſpirits there inhabiting, ſtirs them into a *Delirium*. There are various cauſes and kinds of either of theſe: the chief of which we ſhall here touch upon; and firſt ſhall be ſhewed, how, and for what occaſions, the Blood, being either ſwelled up with too much heat, or being pregnant with an invenomed matter, is the parent of the *Delirium*; foraſmuch as it inſinuates into the Pores and paſſages of the Brain, either fierce and untameable particles, or ſuch as are malignant and deadly to the Animal regiment.

1. Either from the Blood: Or

2. From exteriour Spirits planted in the nervous Stock.

By what, and how many ways the Delirium is cauſed by the Blood:

1. By reaſon of its too great heat.

First, As to the firſt, in the fits of intermitting and in the height of continual Feavours, the blood growing hot, by an immoderate burning, ſometimes ſtirs up the *Delirium*, by the mere force of its Ebullition or boiling up; to wit, for that it ſwelling up very much, whilſt it paſſes thorow the ſmall ſhoots of the Arteries, every where diffuſed thorow the outward compaſs of the Brain, it very much blows them up and diſtends them; and ſo preſſing together the ſubſtance of the Brain, variouſly drives in the Spirits, and as it were compells them into very confuſed troops: Moreover, from the blood ſo ſwelling up, with a frothy rarefaction, the Effluvia's of heat, and with them heterogeneous particles, entring into the Pores and paſſages of the Brain, agitate the Spirits, and tumultuouſly ſnatch them hither and thither.

2. By reaſon of untameable Particles carried from it into the Brain.

Secondly, Almoſt for the like reaſon Drunkenneſs, a deep Sleep, or a *Delirium*, is brought in; to wit, foraſmuch as the bloody maſs doth inſinuate the ſpirituous particles of the Wine, (by which it grows hot) into the Pores and paſſages of the Brain, by which the Spirits dwelling in them, are either plainly overturned, or are moved into inordinate and confuſed motions. For that the untameable little Bodies of Wine or Beer plentifully drunk, open the ſhut places of any Brain, how ſound and firm ſoever it be, and penetrating deeply into the Marrowy paſſages, diſturb and plainly overturn the Acts both of reaſon and of the imagination.

3. By reaſon of malignant Particles ſuffuſed from it.

Thirdly, The blood ſuggeſting not only feavouriſh and turgid, or vinous and untameable particles, but ſometimes malignant, and as it were venomous to the Animal regiment, ſtirs up a *Delirium*, either with or without a Feavour. As to the former, in the Plague, Small Pox, malignant Feavours (although the heat be but moderate) the malignant matter being tranſlated to the Brain, becauſe it diſſipates a great company of Spirits (rather than that it drives them into tumults) brings forth abrupt, incoherent, and at length diſtracted notions.

4. By reaſon of Effluvias, or venomous Particles, obtruded alſo on the Brain.

For the like reaſon alſo, ſome intoxicating and venomous things taken inwardly, and (as ſome affirm) outwardly applied, quickly cauſe a *Delirium*. This is commonly reported of the furious night-ſhade, *Mandrakes*, and ſome other plants; as for the roots of wild Parſnips, the thing is very well known. A certain intimate friend of mine told me, and he was a Man that might be credited, and alſo very learned, That he entring into the Houſe of a certain Gentleman, found the Miſtreſs of the Family, her Daughters, and all her Maids (excepting one) become all at once Delirious, and ſpeaking abſurd and incongruous ſpeeches, run up and down and leaped about the Houſe; and for that he plainly thought them all mad; he learnt of the ſober Maid, who had her reaſon, and was her ſelf, that all that had happened from their eating of Parſnips, which ſhe had not taſted: Which indeed the event ſhewed to be true; for after they had tired themſelves, and fallen to ſleep, they all at length awakned ſober. We have not here leaſure to examine, whether this or other kinds of intoxicating things, infeſtous rather to the animal government, than the vital, do communicate to the Brain their evil, by the paſſage only of the Blood, or alſo in ſome meaſure, by a contact of the ſpirits reſiding in the Ventricle.

5. By reaſon of its afflux being denied to the Brain.

But moreover, we advertiſe you, that ſometimes a *Delirium* is excited from a want, and great diſſipation of the Animal Spirits; becauſe their ſeries or orders being kroken off, and drawn one from another, like as if they were tumultuarily heaped together, cauſe confuſed and incongruous notions. Hence it is obſerved, that ſome have become Delirious by great *Hæmorrhagies*, or long watchings, and exceſſive want of Food; for this reaſon, many are wont to die delirious, and talking idly.

There

There remains the other kind of *Delirium*, in which the Blood being faultleſs, the Animal Spirits flowing ſome where in the nervous ſtock, firſt enter into diſorder; then the ſame affection creeping thorow the nervous paſſages to the Brain, ſtirs up the Spirits inhabiting its middle part into a *Delirium*. This is ſufficiently obvious in the paſſions that are called *Hyſterical*; to wit, after a ſwelling up of the Belly, and an oppreſſion of the Heart, doth ſucceed ſometimes a lying ſpeechleſs, ſometimes a talking idly, with weeping and laughing. In like manner I have obſerved in a moſt cruel *Colick*, that ſometimes after great torments obout the Bowels and the Loins, they have fallen into a *Delirium*, then a little after this ceaſing, the torments have returned. I knew a young Maid (as we have ſomewhere elſe mentioned) from the taking of an *Emetick* Potion, whilſt it worked, was wont conſtantly to fall into a *Delirium*. I have alſo often noted, that a *Gangrene* beginning in ſome external member, has cauſed a *Delirium*. And this in a Wound or Ulcer, is ordinarily noted for a mortal ſign; becauſe it denotes the Animal Spirits in the diſtemper'd part to be ſlain. *How a Delirium proceeds from the irregularities of the exterior Spirits.*

Nor doth this *ſymptom* coming upon thoſe who are long ſick and almoſt worn out, give any better *prognoſtick*; in the fits of intermitting Feavours, it is almoſt ever ſafe; but in continual Feavours dubious, and of ſomething a ſuſpected event; in malignant it more often fore-ſpeaks evil; in Convulſive Diſeaſes, the firſt aſſaults of a *Delirium* for the moſt part are free from danger, but yet its frequent coming, frequently turns that diſpoſition into a *Carus*, *Apoplexy*, or *Palſie*. *The Prognoſtick of a Delirium.*

This Diſtemper, as often as it is ſeen to be ſafe enough, requires not a Cure; for the fit quickly and eaſily paſſes over: yet, becauſe ſome, who have a looſe and weak Brain, and the Animal Spirits too eaſily diſſipable, and apt to flight and confuſion; being diſturbed by any light occaſion, are wont preſently to grow Delirious and to talk idly; therefore there is need of Medicine for theſe, not only of *Hellebore*, but alſo *Cephalick* Remedies, which may ſtrengthen the Brain, and fortifie it againſt the incurſions of the Morbific matter; alſo which may fortifie the Animal Spirits, and render them more fixt and ſtrong for reſiſting. We have above deſcribed the forms of theſe kind of Medicines, and their manner of adminiſtration, which are profitable for the taking away the foregoing cauſe of any other *Cephalick* Diſeaſe. *Its Cure.*

A *Delirium* coming upon continual and malignant Feavours, requires a peculiar way of healing: for in the firſt place, it ſhews the morbific matter dangerouſly tranſlated towards the Head, and therefore ought to he called back from thence, by any means; for which end may be laid Plaſters that draw bliſters to the hinder part of the Neck, other Plaſters or Pultiſſes, or the fleſh of living Creatures, or their warm bowels to the feet; inwardly may be taken temperate *Cephalicks*, as Powder of Coral and Pearl, black Cherry Water, or Water of Cowſlip Flowers, or Poppy Water, and others ſweetning and cheriſhing the ſpirits.

Theſe being thus premiſed, concerning the firſt and moſt light manner of fooliſhneſs or talking idly, we will proceed to its higher degree, *viz.* the *Phrenſie*, which is far longer, and more durable, than the former Diſtemper. In the *Delirium*, a perturbation of the Spirits, inhabiting of the Brain, being excited, is like a waving of waters, from a ſtone flung into a River; but in a *Phrenſie*, their commotion ſeems as it were the ſtorm of waters, raging in a tempeſt.

The *Phrenſie* is defined, to be a continual dotage, or deprivation of the principal faculties of the Brain, ariſing from an Inflammation of the *Meninges*, with a continual Feavour. To this Diſeaſe there is another of kin, *viz.* the *Paraphrenſie*, commonly called, or additional *Phrenſie*, whoſe cauſe is not an inflammation of the Membranes which cover the Head, but as they affirm of the *Diaphragma*. Further, in either Diſtemper (as alſo in the *Pleuriſie* but falſly) it is affirmed, that the Feavour doth ariſe as it were only ſymptomatical, from the ſame conjunct cauſe, *viz.* from the Inflammation of ſome part. But indeed, that the *Phrenſie* doth rather ſucceed the *Feavour*, and is produced, becauſe the boiling blood doth transfer its aduſt or burnt recrements to the Head; *Hippocrates* long ſince, and now every common body, obſerves: to wit, for that the Urine of one ſick of a Feavour, being changed from a troubled and thick, into a thin and wateriſh Urine, ſhews a *Phrenſie* at hand: Wherefore, from hence, the cauſe of this Diſtemper is concluded to be a tranſlation of the Feavouriſh matter into the Brain. *Of the Phrenſie, what it is.* *The Paraphreneſis.*

But as to the conjunct cauſes of the *Phrenſie*, and *Paraphreneſis*, we may eaſily ſhew, that the former doth not always proceed from the Inflammation of the *Meninges*, nor this latter from the Inflammation of the Midriff. I have often ſeen in Anatomical Diſſections, the *Meninges*, yea ſometimes alſo the exterior compaſs of the Brain, *Their Conjunct Cauſes.*

Brain, beſet with an inflamed tumor, and the ſick not diſtemper'd with a *Phrenſie*, but on the contrary with a ſtupidity, and have dyed with a *Carus*, or ſome other ſleepy Diſeaſes. And truly, that it is ſo, reaſon plainly declares; for the *Meninges* being inflamed, and by that made more tumid, preſs together the Brain very much, and about its compaſs ſhut up the ways and paſſages of the Spirits; ſo that the functions of waking and memory being hindred, the *Lethargy* (as it appears *de facto*) neceſſarily follows: Notwithſtanding, far otherways in the *Phrenſie*, all the paſſages and Pores of the Brain, for the excurſions of the Spirits, ſeem to be too largely open; becauſe the Images hidden or laid up, are raiſed all at once, out of the utmoſt, and all the places of the memory, which together with others, ſuggeſted from the Phantaſie to the common ſenſory, tumultuouſly, bring forth ſuch manifold and highly confuſed notions. There is only wanting to the ſenſitive ſoul, for its expanſion to be ſtraitned or looſened, within the Head (which certainly the inflammation of the *Meninges* would effect) rather than that it ſhould be dilated above meaſure, and that all the Pores of the Brain ſhould be unlocked and carried beyond its wonted compaſs. Perhaps it may happen, from a long continuance of this Diſeaſe, that the Blood being greatly heaped up within the Veſſels of the *Meninges*, and there ſtagnating, that it may at length bring forth an Inflammation in them; and then for that reaſon, we may ſuſpect, (becauſe it often ſo falls out) that the *Phrenſie* doth paſs into the *Carus*, or *Lethargy*, of which *phrenſical* perſons often dye.

The Phrenſie not from the Inflammation of the Meninges.

No leſs do we reject the Inflammation of the *Diaphragma*, which cauſe of the *Paraphreneſis*, *Galen* in times paſt, and moved by his authority, moſt *Phyſicians* in every age ſince, aſſerted: *Anatomical* obſervations plainly prove the contrary. Some time ſince, diſſecting the dead Carcaſe of a Maid, dying of a ſudden *Leipothymy* or ſwooning away, we found in the fleſhy part of the *Diaphragma* a great Impoſthume, with a bag full of filthy matter, and watery little bladders; yet ſhe was not troubled ever with a *Delirium* or *Phrenſie*. Some time ſince alſo when we had made an *Anatomical* Inſpection of a Gentleman of the Univerſity, (of whom we have made mention in a late Tract) who dyed of a long ſpurious *Pleuriſie*, it manifeſtly appeared, that a great Impoſthume being ripened in the *Pleura*, and the intercoſtal Muſcles, and broke inwardly, that a vaſt plenty of matter had flowed forth into the cavity of the *Thorax*, which gnawing the *Diaphragma* lying under, had made a great hole in it; nor was this man however in all his ſickneſs *Delirious*, or Frantick. Wherefore, I think this Diſtemper ſcarce ever to be produced from ſuch a cauſe: but that opinion ſeems to ariſe from hence, becauſe oftentimes in a true *Phrenſie*, together with a continual raving, the motion of the *Diaphragma* is wont to be hindred or perverted; as is gathered from the unequal and difficult breathing, to wit, ſometimes anhelous or breathing ſhort, and as it were ſuſpended, ſometimes ſhort and ſwiftly repeated, with ſometimes a double breathing; which kind of *ſymptoms*, and alſo at the ſame time the alienation of the mind, are ſaid to proceed from the Midriff being inflamed, and for that reaſon convulſed; wherefore the Ancients called the Diphragma *Phrenes*: But there was no need for this, if they had conſider'd, that the whole action of the *Diaphragma*, doth depend upon the flowing forth of the Animal Spirits from the *Cerebel*, and therefore there is a neceſſity, if the *Phrenetick* matter invading the Brain, ſome part of it ſhould with it ruſh into the *Cerebel*, that beſides the raving, the motion alſo of the Midriff, though of it ſelf innocent, ſhould be altered; as we have ſhewed elſewhere more largely.

The Paraphreneſis not from the Inflammation of the Diaphragma.

Wherefore breathing is hurt in this Diſeaſe.

Therefore the formal reaſon of the *Phrenſie* ſeems to conſiſt in this, that the Animal Spirits being at firſt very much irritated in the whole Brain, are driven into inordinate, very confuſed, and alſo impetuous motions; ſo that the acts of every Animal Function are depraved, and variouſly perverted; and at the ſame time, very many Ideas of things being raiſed up out of the memory, the old are confounded with the new, and ſome evilly joined, or wonderfully divided, are confounded with others, the imagination ſuggeſts manifold *Phantaſms*, and almoſt innumerable, and all of them only incongruous; and the common ſenſory repreſents the images of ſenſible things diſtorted, double, or incoherent; that hence the mind and the will, chooſe or pick out nothing but ridiculous and impertinent conceptions and paſſions; and cauſe the actions of the body to become almoſt only irregular. Moreover, the ſpirits being ſtruck as it were with madneſs, tumultuate not only in the Brain, but alſo in the *Cerebel*, and every where in the nervous Stock; wherefore, *Frantick* people not only talk idly, but breath unequally, ſpeak aloud, ſtrike with their fiſts, fling about their hands and feet, yea and ſtretch forth all their members with a mighty ſtrength, and a moſt ſtrong force, that indeed the whole Soul ſeems to grow hot and furious in the whole body, to be mad, or rather as it were to be

The formal Reaſon of the Phrenſie.

inflamed

inflamed with a ſudden burning. And truly a *Phrenſie* cannot be more aptly defined, than that it is a burning or inflammation of the whole ſenſitive ſoul, or animal ſpirits, as to their whole *Hypoſtaſis* or Conſtitution. This burning always beginning from the ſpirits inhabiting the Brain, and wandring from thence into the other parts of the ſenſitive ſoul, ſeems to receive from the Blood, firſt growing hot and raging with a Feavouriſh fire, both the firſt incentive matter, and then the conſtant food of the burning. For indeed it is probable, that the blood burning Feavouriſhly, doth pour forth on the Brain ſometimes ſulphureous Particles, together with the ſpirituous, which being half inflamed, and after a ſort burning forth, penetrate together with the others, and from thence immediately entring into all the marrowy and nervous paſſages, adhere every where to the ſpirits, and ſo render them being inflamed, highly rageing and implacable. Certainly it is more likely, that the *Phrenſie* is rather excited after this manner, by an inflammation of the Spirits, than from that of the *Meninges* or of the Brain, which more ſurely cauſes an Headach or *Lethargy*, than a Fury, as we have frequently found by *Anatomy*.

This Diſeaſe proceeds from the burning of the Animal Spirits.

The Inflammation of the Meninges ſtirs up rather the inveterate Headach, or the Lethargy, than the Phrenſie.

And indeed, that it is ſo, is not only ours, or any new opinion, but that great follower and beſt interpreter of *Hippocrates*, *Proſper Martianus*, who hath affirmed the ſame thing, almoſt in expreſs words, *viz.* Comment on his Book *De Morbis* 3. *verſ.* 99. *pag.* 151. he ſays, "That *Hippocrates* doth call the *Phrenſie* a *Delirium* with a Feavour, "which is continual, and depends upon a firm and ſtable Diſtemper: to wit, from "an inflammation of thoſe parts, which ſerve to inſtitute Nature, Reaſon, and the "Mind; For ſo the Animal Spirits, whoſe viciouſneſs cauſe the *Delirium*, do not "grow hot as it were by a ſimple quality, but are altered as to their ſubſtance. This Man manifeſtly diſtinguiſhes between heat and flame, and affirming that to be in reſpect of quality, and this an alteration in reſpect of ſubſtance, plainly aſcribes the cauſe of the *Phrenſie* to the inflammation of the Spirits. He has in the ſame place more things appoſite to our matter, to wit, that the containing cauſe of the *Phrenſie* was not the inflammation of the *Meninges*, but of the Spirits, whoſe ſubſtance is indeed altered, that is, foraſmuch as it is become fiery, ſuch a continual *Delirium* is excited.

Proſper Martianus *alſo aſſerts this.*

I have oftentimes compared the production of the Spirits from the Blood into the Brain, to a Chymical Diſtillation; of which it is obſerved, if the ſpirituous ſulphureous liquor be provoked with too ſtrong a fire, that in Diſtilling it ſometimes takes fire, and aſcends in the *Alembick* with a very great flame. This is known of Oyl of *Turpentine*, of it ſelf, or with the Flowers of *Sulphur*, to the great loſs of ſome. In like manner we may believe, that the blood growing more ſtrongly hot, doth often communicate alſo a burning to the Spirits diſtilled out of it, *viz.* that ſome half burnt Particles, do inſinuate themſelves into the Pores of the Brain, which ruſhing into all the paſſages of the Spirits, both there and in its appendix, every where inkindle the Spirits, and compel them into moſt ſwift motions, almoſt like Lightning.

Chymical Spirits in their diſtilling are ſometimes inflamed.

So the Animal Spirits.

But becauſe the *Phrenſie* doth not come upon all Feavours, but only on thoſe highly burning, the reaſon is plain by what follows; to wit, the cloſure of the Brain ought to be ſo ſhut up, that not only any extraneous thing might not be poured into them, but that the more intenſe flame of the Blood, however burning it be, and though planted round about, might not be able to break thorow; wherefore, ſome diſtemper'd with a burning Feavour, although the Blood grows hot thorow the whole, the Bowels burn, the Marrow rages, the Tongue and Jaws roſted like a coal, yet the Brain being ſtill firmly ſhut up, all the Animal Functions remain whole and ſound. But on the contrary, others who have a weak and too looſe a Brain, and their Blood more ſulphureous than it ought, become *Phrenſical* not only from a burning Feavour, but ſometimes from a more gentle viſit. By reaſon of what foregoing cauſe, and for what occaſions, or evident cauſes, this is wont to happen, is the next thing we ſhall inquire into.

What the Indiſpoſition of the Brain is to the Phrenſy.

Hitherto hath been ſhown that the immediate ſubject of the *Phrenſie* is the ſenſitive Soul, or the *Hypoſtaſis* of the Animal Spirits, and that the formal reaſon of the Diſeaſe doth conſiſt in their Inflammation, and that the conjunct cauſe is the ſulphureous particles poured forth from the Blood into the incloſures of the Brain, and there continually inkindling the Spirits; and now it is no difficult matter to aſſign its *procatartick* or foregoing cauſes, which we find partly in the Blood, and partly in the Brain and its inhabitants.

The Procatartick Cauſes of the Phrenſy,

The previous diſpoſition of the Blood, diſpoſing to the *Phrenſie*, is ſometimes ſimple, ſometimes twofold; the former is an hot, ſharp, or bilous conſtitution of it, to wit, that contains very many ſulphureous Particles in it ſelf, which are apt to inflame the

which are partly in the Blood, and

the Blood in a Feavour more than ought to be, and to inſinuate its burning into the Brain. This diſpoſition, when it is very potent and active, often produces this Diſeaſe of it ſelf; but for the moſt part, there is another diſpoſition of the Blood, which helps that former, and renders it more efficacious, to wit, that, beſides the ſulphureous and inflameable Particles, there are others ſharp and penetrative, which enter into the Pores, and open them, ſo that the former more eaſily enter in, or are introduced: This the ſaline little Bodies, conjoined with the ſulphureous, do in a manner effect; hence Cholerick and Melancholick perſons growing Feavouriſh, are more prone to become furious; but much more do the *Heterogeneous* Particles, implanted in the Blood, and moved by a Feavour, open the doors of the Brain, and intromit all that are inflameable: wherefore a *Phrenſie* frequently comes upon the Small-Pox, and malignant, and Peſtilential Feavours.

Partly in the Brain.

The other proviſion to a *Phrenſie*, which is of the Brain, conſiſts partly in its temper and conformation, and partly in the diſpoſition of the Spirits inhabiting it: As to the former, thoſe indued with an hot and dry Brain, are found to be moſt prone to a *Phrenſie*; not becauſe that conſtitution is more obnoxious to an inflammation or burning, (for to this it is leſs apt) but becauſe in ſuch a Brain, otherwiſe than in an hot and moiſt, or cold and dry, the Pores and paſſages are more open, and too much gaping, and ſo give an entrance to the incentive matter, ſuggeſted from the Feavour: which beſides, they much more eaſily admit, if the Spirits being very fugacious or apt to flight, or *pathetick*, or paſſionate, are upon every light occaſion ready to fall into paſſions of ſadneſs, fear, anger, or hatred; ſo that they reſiſt not the incurſions of the extraneous matter, and more readily conceive a burning themſelves.

The evident cauſes of the Phrenſie.

The evident cauſes of the *Phrenſie* are either more remote, *viz.* whatever things are wont to excite a Feavouriſh intemperance; as Surfeits. Drunkenneſs, a very vehement diſturbance of either body or mind, uſual evacuations being ſuppreſſed, with many others; or more near, as a Feavour, and its dependences and adjuncts; to wit, if it be peſtilential, malignant, or after an evil manner; if it ariſes by reaſon of a Surfeit taken from very incongruous Meats or Drink, or if it ſucceeds violent paſſions, as of Love, hatred, envie, indignation, or ſadneſs, or immoderate ſtudies: for theſe kind of occaſions render the Blood and Animal Spirits, growing Feavouriſhly hot, very propenſe to the frantick Diſtemper.

The differences of it.

Since that this Diſeaſe depends rather and more immediately upon the Soul than upon the Humors or ſolid parts being diſtemper'd, its kinds and differences are neither various nor manifold: In reſpect of magnitude, the *Phrenſie* is either great or moderate, alſo continual or intermitting; to wit, according as the Animal Spirits are more or leſs inflamed, and as they receive the food of their burning continually from the Blood, or by turns. Secondly, As the burning begins only in the Brain, or together with it in the Cerebel, it is commonly diſtinguiſhed into the *Phrenſie*, or the *Paraphreneſis*; which is as much as to ſay, that either the ſpontaneous Animal Functions are only or chiefly hurt, or elſe together with them the vital alſo. But this Diſeaſe as to the Feavour, on which it depends, hath its nature and manner malignant, or free from malignity; alſo according to the temper of the ſick, the *Phrenſie* is diſtinguiſhed into Sanguineous, Cholerick, Phlegmatick, or Melancholick; and this not improperly, for the Animal Spirits are wont to grow hot and burning, after a diverſe manner, in this Diſeaſe, according to their various diſpoſitions.

The Prognoſtick.

The *Prognoſtick* in this Diſeaſe is always doubtful, and the event is to be inſtituted with an evil ſuſpicion: For the Phrenſie of it ſelf (as *Trallianus* ſays) *is a moſt acute and moſt dangerous Diſeaſe*; then, if it comes upon a Peſtilential, or malignant Feavour, or of ſome other evil kind, we cannot but expect the end of it to be mortal.

If a *Phrenſie* happens in a ſound body, well habited, of a Sanguine temperament, and young, there is greater hopes of health, than if it were ſickly, aged, lean, or Cholerick, and obnoxious to violent Paſſions.

If the *Phrenſie* remitting by frequent turns, have lucid intervals, it is better than if the fury ſhould be undiſcontinued: But if the ſick ſometimes ſeem to be better, yet after moderate ſleep to awake always furious, it is a ſign that the Diſeaſe is pertinacious, and for that reaſon dangerous; for that a new ſtock of incentive matter is from thence carried to the Brain; which indeed we have elſewhere ſhewn to be made far more plentifully in ſleep than waking.

A *Phrenſie* is in a ſhort time terminated with the Feavour, either in health or death; or elſe it is protracted, and remains after the Feavour; or at length it is healed, or paſſes into other Diſeaſes, to wit, the *Lethargy*, or *Madneſs*, or *Melancholy*.

If the *Feavour* having a laudable *Criſis*, either by Sweat or great quantity of Urine,

is

is fully cured, for the moſt part the *Phrenſie* alſo ceaſes; but if the Feavour be not cured and carries ſtill the Morbific matter to the Head, ſo that beſides the Animal Functions being depraved, the vital begin to fail (which appears by the Pulſe and breathing being altered for the worſe) if the Urine be pale, if that frequent bleeding at the Noſe, if Vomiting, and Convulſion happen, the *Phyſician* concludes death to be at hand.

Sometimes a *Feavour*, though it be not at once or fully Cured, yet paſſing away afterwards ſlowly and by degrees, leaves a *Phrenſie*, or a talking idly behind it; which, if it doth not by its ſtay obliterate the former tracts of the Spirits in the Brain, either will end by little and little of its own accord, or is to be healed by the help of Remedies.

If that by reaſon of the *Phrenſie* being long protracted, the *Meninges*, or the *Cortex* of the Brain, be poſſeſſed from the Blood, or *Serum*, there heaped up, and ſtagnating; with an inflamed tumor, or a ſerous deluge, the *Lethargy*, or ſleepy Diſeaſes follow; the Cure of which is often very difficult, or not at all. But if from a long *Phrenſie*, either the Animal Spirits (though their burning ſhould ceaſe) contract a vicious nature, or that the paſſages and Pores of the Brain are perverted, a perpetual raving oftentimes ſucceeds, the former Diſeaſe paſſing into Madneſs, or Melancholy, or fooliſhneſs or ſtupidity. Wherefore it is vulgarly ſaid of thoſe that are *Frantick*, and not ſoon Cured, that their Brains are crack'd or broken, ſo that after that, they are always Mad or raving.

The Cure of the Phrenſie.

In the Cure of the *Phrenſie*, we ought to reſpect at once the Feavour and the Fury. The Feavouriſh burning of the Blood, or its immoderate growing hot (which for the moſt part is the antecedent cauſe of the other effect) ought in the firſt place to be appeaſed and allayed, and the Animal Spirits to be cheriſhed, and freed from any great burning. If the *Phrenſie* happens about the beginning of the Feavour, or the middle of it, the ſame Remedies in a manner, and the ſame method of curing conduce to either end: But if this Diſtemper comes upon this, whilſt it is at a ſtand, or at its height, the means of Curing are oftentimes repugnant to either, and there is need of great caution, leſt whilſt we endeavour to help one Diſeaſe, we do not increaſe the other; in this caſe, the vital indication concerning the preſerving of ſtrength, obtains the firſt place; and the taking away of blood, or purging, is not to be raſhly and copiouſly celebrated.

Phlebotomy.

In the former caſe, when the Feavour and the *Phrenſie* are almoſt both of an age, *Phlebotomy* rarely or never is to be omitted, but is preſently to be performed, and if ſtrength will bear it, let it be afterwards repeated. For nothing depreſſes and diminiſhes the immoderate flame of the blood, like to this Remedy, and nothing more averts or recals its burning from the Animal regiment: Wherefore, if the matter requires it, let a vein be opened, ſometimes in the Arm or Hand, ſometimes in the Leg or Foot, and ſometimes in the Neck or forehead: perhaps ſometimes it may be expedient to open the temporal Artery: yea alſo to take away blood in other places by Leeches, and ſometimes by Cupping-Glaſſes. For this gives the chiefeſt help, and according to *Galen*, is the *moſt powerful and principal Remedy*, and is wont to fulfil very many indications in a *Phrenſie*.

Clyſters.

But for the prevention of the Feavouriſh matter being carried from the Bowels into the Head, Clyſters are of chief uſe; with which, if need be, let the Belly be continually kept ſlippery. Vomiting Medicines, and Purging, unleſs very gentle, have very rarely any place here. *Cataplaſms* of Rue, Chamomel, Vervine, Bryony Roots, red Poppies, with Sope, may be laid all over the Feet; or inſtead of them, may be applied Pigeons or Chickens, cut up and laid warm: In the mean time, as you ſee occaſion, there ought to be preſcribed *Juleps*, *Apozems*, *Powders*, and *Confections*, by which the rage of the Blood, and the burning of the Animal Spirits may be allayed.

A Julep.

Take *of Pipin Water, Black Cherry Water, and Cowſlip Water, each four ounces; Water of the whole Citrons two ounces, of Pearl powder'd one dram, of Syrup of the juice of Citron one ounce; mingle them and make a Julep: let three ounces be taken three or four times in a day.*

An Apozem.

Take *of Graſs Roots, of the Leaves of Wood-Sorrel, and Pimpernel, each one handful; of Barly half an ounce, of Apples cut, of Currans, or Strawberries, or Rasberries, one handful; let them be boiled in four pints of ſpring-water, till a third part be conſumed; clarifie it, and ſtrain it; then add to it of the Syrup of Violets one ounce, and of Sal Prunella a dram and a half.*

A Drink. Take *of the Leaves of Borage freſh gathered and young, four handfuls, of Wood-Sorrel two handfuls, two Apples ſliced, of Sal Prunella two drams, the pulp of one Orange, of white Sugar one ounce; let them be bruiſed together, and pour to them of ſpring-water two or three pints; let them be ſtrongly ſqueezed forth, and kept in a Glaſs, and cleared from its ſetling; let ſix or ſeven ounces be taken of this often in a day, when they will. For the quenching of thirſt, let the excellent drink of Palmerus,* viz. *Spring-water with Sugar, and the juice of Lemons, or Water, or Poſſet-drink with Elm leaves, or Pimpernel infuſed or boiled in it, be drunk: Emulſions of the Decoction of the roots and flowers of Water-Lilies, with Melon-ſeeds; or elſe Spring-water diſtilled with the pulp of boiled Apples diſſolved in it.*

Hypnoticks. *Hypnoticks* or Medicines cauſing reſt, are often very neceſſary in this Diſeaſe; but yet the ſtronger are not convenient in the beginning, nor let them be frequently uſed; becauſe ſleep cauſed by Opiates, carries more morbific matter to the Brain, and fixes it more deeply there.

Take *of the Water of Cowſlip flowers four ounces, of the Syrup of Poppies half an ounce, of Pearl one ſcruple; make a drink to be taken at night late.*

Take *of the Seeds of white Poppy two drams, of Sugar-Candy a dram and a half; bruiſe them together, and pour to them of white Poppy Water ſix ounces; make an expreſſion, to be taken after the ſame manner.*

Narcoticks or Stupefying Medicines, which are made of things meerly cold, are cautiouſly to be exhibited; becauſe they agree not with ſome, who have the Fibres of their Stomach very tender and ſenſible. I have often obſerved theſe kind of *Hypnoticks*, to have ſtirred up a great oppreſſion in the Ventricle, and then preſently an Inflation or blowing of it up; and a little after diſtractions and inordinations of Spirits uſe to follow in the Brain, yea in the whole Body; ſo that there was not only a fruſtration of ſleep, but great diſquietneſs was ſtirred up.

Take *of liquid Laudanum, prepared with the Salt of Tartar, or the juice of Quinces, Let a Doſe of it be taken in a convenient liquor.*

External Medicines cauſing Sleep. Things inviting Sleep, as *Epithems* or moiſt Medicines applied to the Temples and Forehead, are often uſed with ſucceſs; of which ſort are Roſe-cakes dipt in Vinegar, Roſe-water, and grated Nutmeg, an Embrocation or waſhing with Water or Milk, Oyntments of Oyl of Nutmeg by expreſſion, Oyntment of Poplar, to which ſometimes may be added *of Opium five or ſix grains*; or a Cake of Poppy flowers, with Vinegar and Nutmeg, *&c.* Further, for this end, rather than for the taking away the inflammation of the *Meninges*, *the hot Lungs of a Lamb or Weather*, as alſo *Pigeons or Chickins ſlit in two*, do often give notable help. Alſo for this uſe *Houſleek bruiſed, and mixt with a Womans Milk, and applied to the hinder part of the Head being ſhaved, is wonderfully praiſed*; Alſo *the Epithem of Penotus, of twelve grains of Nutmeg, of Camphir half a ſcruple, and the Tincture of Roſe-water impregnated with red Sanders twenty ounces, is commended by ſome.*

Epithems. Further, they are wont to apply *Epithems* not only to the Head, but alſo to the Heart, Liver, and other parts: *A little bag of ſilk may be applied to the Præcordia, with Cardiac Species being ſewed or quilted in it, with ſilk, and ſprinkled with Roſe-water, or Vinegar of Roſes*; alſo *rags wet in Roſe Vinegar, may be laid to the Teſticles: The Feet way be bathed with a Decoction of Willow leaves, Lettice, or the heads of white Poppy.* But theſe kind of cooling Topicks only, and cheriſhers are to be uſed in the beginning of the Diſeaſe; but in its height, reſolvers and ſoftners, are to be added, as *the Flowers of Chamomel, Melilot, Elder, &c.* alſo *the leaves of Mallows, Orage, Marjoram, Hyſop*, and ſuch like: In the declining of the Diſeaſe, reſolvers only, and thoſe ſparingly are to be adminiſtred.

The means for the preſerving of ſtrength. In the mean time, there ought to be great means uſed, for keeping up of ſtrength, for that too much failing, all hopes of Cure is loſt. For ſtrength is quickly worn out, by reaſon of great watchings, the perpetual agitations both of the body and mind, a thin Dyet, and Phlebotomy ſometimes often requiſite. Wherefore, great care muſt be had, leſt whilſt we endeavour to root out the Diſeaſe, by Purging or frequent letting of Blood, we ſhould ſuddenly debilitate the Vital Function: If this begins to fail, the *Phrenſie* being let alone, a better dyet may be granted, and eſpecially Cordials are to be uſed.

Take

Take *of the Tincture of Coral half an ounce, take of it twenty drops, twice or thrice in a day, with a Doſe of a Cephalick or a Cordial Julep; or let it be given with Coral diſſolved in Milk, made with the juice of Oranges, one ſpoonful often in a day.* Cordials.

Take *of the Rob or Conſerves of Rasberries, and Barberies one ounce, of prepared Pearl, of Magiſtery of Coral, each one dram; of Confection of Hyacinthæ two drams, Syrup of the juice of Alchermes, what will ſuffice; make a Confection, and let the quantity of a Nutmeg be taken three or four times a day, drinking after it of the following Julep three ounces.*

Take *of the Water of the Flowers of Water-Lilies, red Roſes, and of Elm leaves, each three ounces; of the Syrup of Coral two ounces, of the Cordial Water of Saxony one dram; mingle them.*

Take *of the Conſerves of the Flowers of Water-Lilies, and of Violets, each one ounce; the Stalks of Lettice candied or preſerved half an ounce, of the Powder of red Coral, bruiſed in a morter with the juice of Orange and dryed, two drams; of the Species of Diamarg. frigid. one dram, of white Poppy ſeeds one dram and a half, with what will ſuffice of the Syrup of the juice of Wood-Sorrel; make an Electuary; let the quantity of a Nutmeg be taken often in a day.*

In the *Phrenſie*, not only the Belly, but alſo the Bladder, and their offices, ought to be thought on, and often ſolicited or provoked.

Wherefore, the ſick are to be warmed, and the Urinal given them, and asked to make water; but if they will not, or cannot, let the region of the yard below the belly be bathed *with a Decoction of Pellitory of the wall, Elder Flowers, and of the Seeds of Parſley, and wild Carrot Seeds, or daucus; with a Spunge; and after the Fomentation, anoint it with Oyl of Scorpions, and Oyntment of Dialthæa: In a long ſuppreſſion of Urine, you may put up to the bladder a piece of Wax Candle.*

The Hiſtories and caſes of *Frantick* people are ſo many, and ſo diverſly deſcribed, and ſo accurately by *Hippocrates* in his Books *De Epidem.* that there ſeems little need here to add others; eſpecially, becauſe it would be an immenſe work and tedious, to relate the various manner and caſes of Mad-men: In the mean time, as to the event of the Diſeaſe, there is great diverſity; for that for the moſt part the Feavour being cured, the *Phrenſie* ceaſes by little and little; or elſe, that having no, or an evil, *Criſis*; either death, or a long raving follows. But that our *Hypotheſis*, of the Inflammation of the Spirits, may be illuſtrated, I ſhall propoſe here one more rare inſtance. *The Hiſtorits of ſick perſons in* Hippocrates Lib. Epidem.

I was one time ſent for to Cure a Maid, that was ſtrong, and having a Feavour, was highly raging, being continually bound in her Bed. I took from her a great quantity of Blood, and cauſed it to be again iterated; I often took down her Belly with Clyſters; yea I ordered all the other adminiſtrations in order, uſual in this caſe; in the mean time ſhe took *Juleps*, *Emulſions* and *Hypnoticks*: But theſe little or nothing availing, ſhe continued ſtill for ſeven or eight days without ſleep, and furious, perpetually calling and bauling for cold drink; wherefore an *Hydropick* being granted her at her pleaſure, yea to ſatiety; ſhe was nevertheleſs not any thing leſs quiet, or thirſty: I therefore bid them (for that it was Summer time) that in the middle of the Night ſhe ſhould be carried by Women forth of doors, and put into a Boat, and her Cloths being pull'd off, and ſhe tyed faſt with a Cord, ſhould be drenched into the depth of a River, the Rope being tyed only about her middle, that ſhe might not be ſtifled in the Water; but there was no need of that, for the Maid of her own accord, fell to ſwimming, that ſcarce any Man could do it better, who had learned the art: After about a quarter of an hour, ſhe came forth of the Water ſound, and ſober, and then being had to Bed, ſhe ſlept, and ſweat very much, and afterwards, without any other Remedy ſhe grew well. This Cure ſucceeded ſo happily and ſo ſuddenly, foraſmuch as the exceſs both of the Vital and the Animal flame, being together immenſly increaſed, was taken away by a proper Remedy for the more intenſe Fire; to wit, by the moiſtning, and cooling of the Water. *A notable Hiſtory.*

CHAP. XI.

Of Melancholy.

The Diſtemper of the Animal Spirits, being after a diverſe manner, as it is the cauſe of the Phrenſie, ſo it is of Melancholy, Madneſs, and Stupidity.

AS the *Phrenſie* ariſes from the burning of the Animal Spirits, (as we have elſewhere ſhewn) or as *Proſper Mart.* ſeems to affirm, from their ſubſtance being inflamed; ſo indeed other Diſtempers of raving ariſe from their ſubſtance being altered by other ways, and from their genuine nature being changed, from a *ſpirituous-ſaline*, into an acetous or ſharp diſpoſition, like to *Stygian* Water, or elſe into a liveleſs; which therefore are either *Melancholy*, or *Madneſs*, or *Fooliſhneſs* or *Stupidity:* of which we ſhall now ſpeak in order, and firſt of all of *Melancholy*.

The definition of Melancholy.

Melancholy is commonly defined to be, a raving without a Feavour or fury, joined with fear and ſadneſs. From whence follows, that it is a complicated Diſtemper of the Brain and Heart: For as *Melancholick* people talk idly, it proceeds from the vice or fault of the Brain, and the inordination of the Animal Spirits dwelling in it; but as they become very ſad and fearful, this is deſervedly attributed to the Paſſion of the Heart.

That it is a Diſtemper of the Brain and Heart.

Its Examples or Types various, and almoſt infinite.

It would be a prodigious work, and almoſt an endleſs task to rehearſe the diverſe manner of ravings of *Melancholy* perſons; and there are great Volumes already of Hiſtories and examples of this ſort; and more new and admirable obſervations and examples daily happen. Fabulous antiquity ſcarce ever thought of ſo many *metamorphoſes* of men, which ſome have not believed really of themſelves; whilſt ſome have believed themſelves to be Dogs or Wolves, and have imitated their ways and kind by barking or howling; others have thought themſelves dead, deſiring preſently to be buried; others imagining that their bodies were made of glaſs, were afraid to be touched leſt they ſhould be broke to pieces. There are extant manifold and various kinds of the Imagination ſo depraved, concerning which may be commonly obſerved; That the diſtemper'd are *Delirious* as to all things, or at leaſt as to moſt; ſo that they judge truly almoſt of no ſubject; or elſe they imagine amiſs in one or two particular caſes, but for the moſt part in other things, they have their notions not very incongruous. We ſhall firſt inquire into this more univerſal Diſtemper, for that the Imagination is prevaricated concerning very many things; to wit, by what cauſes, and with what difference of Symptoms, this is wont to come to paſs; afterwards we ſhall ſpeak of the ſpecial raving or idle talking.

Melancholy is either, 1. Univerſal, or

2. Particular.

The primary Phænomena of a Melancholick Delirium.

Although the univerſal Diſtemper of *Melancholy* contains manifold Delirious *Symptoms*, yet they chiefly conſiſt in theſe three; 1. That the diſtemper'd are almoſt continually buſied in thinking, that their *Phantaſie* is ſcarce ever idle or at quiet. 2. In their thinking they comprehend in their mind fewer things than before they were wont, that oftentimes they roll about in their mind day and night the ſame thing, never thinking of other things that are ſometimes of far greater moment. 3. The *Ideas* of objects or conceptions appear often deformed, and like hobgoblins, but are ſtill repreſented in a larger kind or form; ſo that all ſmall things ſeem to them great and difficult.

After this manner the *Phantaſms* in the Brain evilly affected, are objected to the Intellect, almoſt after the ſame manner as the viſible images are ſhewed to the Eye, by the interpoſition of ſome Optick Glaſs; to wit, where every object appears an horrid and huge monſter, and for that reaſon a ſmall portion only of the viſible matter or thing, being increaſed to that immenſity, is received by the aſpect; then by reaſon of its horrid and unuſual appearance, the image being once conceived, is not eaſily or ſuddenly let go: we will now conſider by what affection of the Brain and Spirits, theſe appearances happen.

From what diſpoſition of the Spirits they proceed.

Here we ſhall firſt of all inquire into the diſpoſition or preternatural Conſtitution of the Animal Spirits: For inaſmuch as they are after an irregular manner, they always or for a long time continue in their irregularities; and when the *Palſie*, *Apoplexy*, *Vertigo*, or *Convulſion*, are not joined to this Diſtemper of theirs, which argue obſtructions of the Brain, it may be inferred, that the Animal Spirits, not fetching their force elſewhere, are driven into ſuch inordinations; nor do chiefly conceive their diſorders, by reaſon of the Pores and paſſages of the Brain being obſtructed; but rather, in this caſe, they cauſe theſe aforeſaid *Symptoms* in the ſick from the default of their own Nature.

Such

Such an indiſpoſition of the Animal Spirits is wont to be deſcribed after this manner; to wit, that they, when as they ought to be tranſparent, ſubtle, and lucid, become in *Melancholy* obſcure, thick, and dark, ſo that they repreſent the Images of things, as it were in a ſhadow, or covered with darkneſs: The explication of which does not ſeem incongruous; foraſmuch as we have already ſhewed, that the Animal Spirits flowing forth from the inkindled Blood, go forth after a manner, as the rays of light from a flame. And it ſufficiently appears, that the light ſhews and illuſtrates it ſelf diverſly, according as it proceeds from the burning of bodies, flaming forth after a various manner; as of Spirits of Wine, Oyl, Fat, Mineral Sulphur, Nitre, and others: in like manner the Animal Spirits, foraſmuch as ſtilled forth from the Blood, having got this or that, or ſome other diſpoſition, they are either ſubtil, clear, or dull, thick, and as it were ſooty, they variouſly paſs thorow and irradiate the organs of the Animal Functions, and ſo for that reaſon, diverſly pervert their actions.

As they are compared to Light, they are call'd opacous, or full of darkneſs.

But further, when as the Animal Spirits are not wholly looſe and free as the little bodies of light, but mutually cohere or ſtick together, and leſt the continuity of the ſoul ſhould be broken off, they ought to be contained in a certain *Latex*; therefore theſe, with the Vehicle to which they cleave, may be very aptly compared to ſome *Chymical* Liquors, drawn forth by diſtillation from natural mixtures. Which *Analogy* indeed ſeems fitteſt for the unfolding the mad diſtempers.

Theſe kind of Spirits in Melancholy compared to thoſe in Chymical Liquors.

1. Liquors *Chymically* Diſtilled, are, according to the active Elements after a various manner combined in them, of a diverſe kind: the chiefeſt of theſe, by the conſent of all, are ſaid to be ſuch, as in which the Spirit being united with the Salt, doth volatiſe it, and on the other ſide is ſharpned by it, and after a ſort fixed or kept. Of this ſort they conceive the great *Elixir* and the Liquor *Alcaheſt* to be; and indeed in a manner are the Spirits of Blood, of Harts-horn, of Soot, and ſuch like, very ſubtil, volatil, and penetrating, yet not apt to be inflamed, or ſuddenly to be diſſipated. And indeed, the Animal Spirits ſeem to be after a manner, having obtained a ſound and legitimate diſpoſition, like a ſpirituous liquor ſtuffed with a volatile Salt, which is diſtilled from Blood; beſides, to this there is given from the fire an high Acrimony and *Empyreuma*, or ſmatch of burning, which are wholly abſent from the liquor watering the Brain and Nerves.

1. *They are not like the Spirit of Blood, as they ſhould be.*

2. Other *Chymical* Liquors are ſulphureous and burning, as the Spirits of Wine and Turpentine, which conſiſting of Spirit and Sulphur combined together, are eaſily inflamed, and depart one from another of their own accord, and fly hither and thither what way they can find; the Animal Spirits of this nature, as we ſhewed in the former Chapter, ſeem to be in the *Phrenſie*.

2. *Nor like the Spirit of Wine: Such rather in the Phrenſie.*

3. Some Liquors or Spirits are produced by *Chymical* operation, in which the fixed Salt being carried forth to a Flux, hath obtained the dominion; of which ſort are ſuch as are diſtilled from Vinegar, ponderous Woods, and ſome Minerals, with a gentle fire; whoſe particles are very moveable, and unquiet, but of a ſhort activity, ſo that Effluvia's do not long flow from them, that if they ſhould be diſtilled *in Balneo*, nothing but an inſipid Phlegm would be carried into the *Alembick*. And indeed, the Animal Spirits in *Melancholick* Diſtempers, are to be ſuſpected to be of this kind of acetous nature, with the dominion of a fluid ſalt, as ſhall hereafter be more largely ſhewed.

3. *But theſe are like acid Spirits, diſtilled out of Salt, Vinegar, Box, and ſuch like.*

4. Some *Stagmas* drawn forth by *Spagyrick* art, are ſometimes moſt ſharp, to wit, in which the untamed Particles of a fluid Salt, and alſo *Sulphureous*, and *Arſenical*, being combined together, are exalted; as are the *Stygian* Waters diſtilled out of *Nitre*, *Vitriol*, *Antimony*, *Arſnick*, *Verdigriece*, and the like, all which are of a fierce nature, very penetrating and not to be broken, ſo that their *Effluvia's* are agitated with a perpetual motion, penetrate every thing, and are alſo diffuſed far and wide. And theſe kind of Liquors, may be aptly likened to the diſpoſition of the Animal Spirits, acquired in *Madneſs*, as ſhall be anon declared.

4. *Stygian Waters are like the Nature of the Animal Spirits in Madneſs.*

But for the preſent, that we may deliver the formal reaſon and cauſes of *Melancholy*, let us ſuppoſe, that the liquor inſtilled into the Brain from the Blood (which filling all the Pores and paſſages of the Head, and its nervous *Appendix*, and watring them, is the Vehicle and bond of the Animal Spirits) hath degenerated from its mild, benign, and ſubtil nature, into an Acetous, and Corroſive, like to thoſe liquors drawn out of Vinegar, Box, and *Vitriol*; and that the Animal Spirits, which from the middle part of the Brain, irradiating both its globous ſubſtance, as alſo the nervous *Syſtem*, and do produce all the Functions of the Senſes and Motions, both interior and exterior, have ſuch like Effluvia's, as fall away from thoſe Acetous *Chymical* Liquors. Concerning which there may be obſerved theſe three things, 1. Their being

The formal Reaſon of Melancholy aptly repreſented by acetous Chymical Liquors.

There are three chief affections of these, which agree with the Animal Spirits in Melancholy.

being in perpetual motion: 2. Not long able to flow forth: 3. not only to be carried in open ways, but to cut new Porosities in the neighbouring bodies, and to insinuate themselves into them. From the *Analogy* of these conditions, concerning the Animal Spirits, it comes to pass, that *Melancholick* persons are ever thoughtful, that they only comprehend a few things, and that they falsly raise, or institute their notions of them. We shall consider of each of these a little more largely.

1. Effluvias falling away from these Liquors are perpetually in motion.

1. Therefore we shall take notice, that the Effluvia's falling away from these distilled Acetous Liquors, are perpetually in motion: for the Spirits of Vitriol, or of Vinegar, or Sea Salt continually evaporate: the reason of which is, because those Particles of the fluid Salt do scarcely agree with any others, but where ever they are stopped, being apt immediately to leave their subjects, seem to endeavour to get new consorts. And hence some have thought nothing more like to perpetual motion, than the Acid Spirits of Minerals, shut up and *Hermetically* seal'd in a Phial; for so the Vapours or Effluvia's will creep about the sides of the Glass, with a continual Circulation. In like manner we may suppose, That the nervous Acetous Liquor is instilled from the Blood, sometimes stuffed with a fixed Salt, or with Vitriolick Particles, or other heterogeneous, into the Brain, for the matter and Vehicle of the Animal Spirits; and so these being admitted within the middle part of the Brain, for the acts of the Animal Functions, do not quickly pass thorow and irradiate all the Pores and Passages, but like little acid Atoms, creep about here and there, slowly, but incessantly, and as it were with a certain unquiet motion of tingling or creeping, diffuse themselves by little and little thorow the whole neighbourhood: Hence a storm of thoughts is perpetually stirred up, by which the Brain is wont to be busied without intermission; so that *Melancholic* persons have continually, day and night, disturbed Phantasies; for that their Animal Spirits consist of a continually moveable matter; Hence also they look with eyes turned inwards, or fixed, or obliquely, and sullen or dogged, and exercise the other faculties both sensitive and loco-motive inadvertently; because the Spirits being worn out and distracted by continual motion, do not well actuate or beam into the nervous *System*.

In like manner also the Spirits in the Phantasie of a Melancholick person.

2. Effluvias from acetous Chymical Liquors do not proceed far.

2. Though the Effluvia's continually fall away from an Acetous Spirit, prepared by *Chymical* Art, yet they do not go far, but gather together on an heap thickly, near the superficies of the liquor, and penetrate only the neighbouring bodies, not touching those that are at a distance: Hence the Spirits of *Vitriol*, Salt, or Vinegar, will not ascend out of the *Cucurbit* into the *Alembick* unless urged with a very strong heat; but being included in a low *Phial*, they shall corrode and pierce thorow the stopple.

In like manner the imagination of a Melancholick Person, though always employ'd, comprehends only a few things.

And therefore every thing is conceived with a greater Image than it should be.

It is after the same manner, concerning the *Phantasie* of *Melancholick* persons; for inasmuch as the Animal Spirits being degenerate into an acid nature, do not irradiate or quickly pass thorow the whole compass of the Brain, as before, but flowing in the middle part, are carried with its force only into the nearest Pores and Passages; therefore cogitations raised up from thence, though they be continual, yet they comprehend but a few things: and so, as when many bands of Spirits are thrust together in strait bounds, every small object, and of very little moment, seems to them very great and of notable weight; certainly after the same manner, and for the same reason, as when the visible images passing thorow a *Microscoptick* Glass are carried to the Eye; for, because many beams of the same thing are concenter'd, its magnitude seems to be increased into an immense greatness; so when as every intentional Species or Image, by the conflux of very many spirits together, is formed in the Brain, it appears to the soul greater and of more weight than usual. Every one may experiment this truth in himself: For when as we become thoughtful, from eating gross or melancholick meats, or by reason of the passion of sorrow (the reason of which affection is, because the Animal Spirits are unfit for a more free expansion) then we are very solicitous and fearful, concerning every little thing, as if then our health or fortune were for ever in danger. Hence also, because the Animal Spirits, though almost ever in motion, are notwithstanding still limited within the same short bounds, *Melancholick* persons persist a long while in thinking and revolving in their mind often the same thing.

3. Effluvias from acetous Liquors do not evaporate so much from open Pores, as they make new.

3. But there yet remains another similitude of the Animal Spirits, with those distilled from *Vitriol*, and other saline bodies, to wit, that as the Effluvia's sent away from these kind of Acetous Spirits, do not evaporate so much from open spaces and tracts, before made, as they cut out Pores and Passages that are new, for themselves, in an objected body; so that they easily pass thorow, and render friable or crumbling, the Cork or stopple to the Vessel where they are; which happens not from the Spirit of Wine, to any thing that stops up the Phial; so indeed in *Melancholick* persons, it is usually wont to be. For because the Animal Spirits, being as it were pointed with saline

ſaline Particles, whilſt they flow from the middle of the Brain, they obſerve not their former tracts and ways of their expanſion, but they thickly make for themſelves new and unwonted little ſpaces, within the globous ſubſtance of the Brain: Hence cogitations are brought before the Soul, not ſuch as they were wont to be, but new and incongruous, and for the moſt part abſurd. But indeed, becauſe the *Phantaſie* is prevaricated, about the Conceptions of things, and by reaſon that the acts of judgment and reaſon are falſly framed, the only cauſe is, for that the Animal Spirits leaving their former walks, and going backward and forward in their ways in the Brain, being carried hither and thither obliquely and tranſverſe, affect altogether unaccuſtomed and bye ways, which indeed is proper for them to do, out of the Acetous diſpoſition, with which they labour; to wit, foraſmuch as the Effluvia of thoſe kind of Liquors expand themſelves not in a direct or free emanation, as the rays of light; but by a bending motion, and as it were creeping, they craul on every ſide into the neighbouring part.

And in like manner the Animal Spirits, whilſt they form in the Brain new Tracts, produce unwonted and incongruous Notions.

Thus much for the primary *Melancholick* Diſtemper, to wit, a *Delirium* or Raving, being excited by reaſon of the vices of the Spirits inhabiting the Brain: The beginnings of which, although they proceed chiefly, and oftentimes, almoſt only from the Acetous diſpoſition of the Spirits; yet afterwards, the conformation of the Brain it ſelf is often brought to be a part of the cauſe; to wit, foraſmuch as the Recrements of the *Melancholick* Blood, being perpetually poured forth, renders its ſubſtance more thick and dark, and the primary tracts or paths of the Animal Function being near blotted out, new, oblique, and by-paths are made; inſomuch, that the Spirits, though better ſhould be begotten, could not eaſily irradiate the Brain, or preſently recover their former paſſages.

In Melancholy, after the Animal Spirits being for ſome time vitiated, the Conformation of the Brain is alſo hurt.

Melancholy is not only a Diſtemper of the Brain and Spirits dwelling in it, but alſo of the *Præcordia*, and of the Blood therein inkindled, from thence ſent into the whole Body: and as it produces there a *Delirium* or idle talking, ſo here fear and ſadneſs; but by what means we ſhall now ſee.

The Affection of the Præcordia in this Diſeaſe, as to fear and ſadneſs, is delivered.

Firſt, in Sadneſs, the flamy or vital part of the Soul is ſtraitned, as to its compaſs; and driven into a more narrow compaſs; then conſequently, the animal or lucid part contracts its ſphere, and is leſs vigorous; but in Fear both are ſuddenly repreſſed and compelled as it were to ſhake, and contain themſelves within a very ſmall ſpaces; in either paſſion, the Blood is not circulated, and burns not forth lively, and with a full burning, but being apt to be heaped up and to ſtagnate about the *Præcordia*, ſtirs up there a weight or a fainting; and in the mean time, the Head and Members being deſtitute of its more plentiful flux, languiſhes. The formal reaſons of theſe Diſtempers, and their cauſes, we have before expoſed.

After what manner the Corporeal Soul is affected in theſe two paſſions.

But becauſe theſe are habitual in *Melancholick* perſons, the cauſe is partly in the Blood, and partly in the Animal Action of the heart. For the Blood, becauſe of the ſaline particles being exalted, becomes leſs inflamable; from whence it is neither ſufficiently inkindled in the Lungs, or doth it burn with a plentiful and enough clear flame within the paſſages of the Heart and its veſſels; but is apt to be repreſſed, and almoſt blown out with every blaſt of wind: Hence, when that the vital flame is ſo ſmall and languiſhing, that it ſhakes and trembles at every motion, it is no wonder if that the *Melancholick* perſon is as it were with a ſinking and half overthrown mind always ſad and fearful. By reaſon of this kind of ſaltiſh *Dyſcraſie* of the Blood, *Melancholicks* rarely have a Feavour; yet being taken with it, by reaſon of the irregular burning of the Blood, they are more in danger.

The cauſe of either depends partly on the blood;

No leſs doth it come to paſs, by the fault of the Heart, that *Melancholick* perſons become ſad and fearful, by reaſon of the courſe of the Blood being retarded, and called back from thence: for, becauſe that Muſcle is actuated but with an inflowing of weak and enormous Spirits, it cannot perform its contractions ſtrongly enough, and conſtantly, whereby the Blood may be driven forward into the whole body, without ſtop or leaping back: So the Blood and the Animal Spirits affect one another mutually, with a reciprocal evil, and bring hurt one to the other. That is, the *Melancholick* Blood conſiſting of *Saline* Particles, carried forth together with *Sulphureous*, begets Animal Spirits, indued with an Acetous nature, as hath been ſhown; and theſe Spirits wrongly performing the offices of the Vital Function, cauſe ſuch an evil diſpoſition of the Blood to be increaſed.

and partly on the Animal Action of the Heart.

Thus much of *Melancholy* in general, *viz.* of its Eſſence, Conjunct Cauſes, and chief *Symptoms*, together with the reaſons of them. Before we proceed to the kinds and differences of this Diſeaſe, we ought to explain, from what kind of cauſes, both *Procatartick* and Evident, it is wont to ariſe, and to be cheriſhed; and firſt, from whence either part of the Soul, *viz.* both Animal and Vital, doth acquire their morbid diſpoſitions.

The procatartick Cauſes of Melancholy are,

First

Partly the acetous Nature of the Spirits, and partly the Melancholy Dyscrasie of the Blood: The Distemper begins sometimes from this, sometimes from that.

First we say, the former of these to be Acetous, like to the Spirit of *Vitriol* or Vinegar, and this to be *Salino-sulphureous*, or Atrabilary or Melancholick; further, as the one doth cherish the other, so they at first beget one another. For sometimes *Melancholy* beginning, and for a long time persisting, from the Animal Spirits being disturbed, and driven into a certain confusion, causes the *Melancholick* disposition of the Blood; and sometimes also the Blood, at first contracting this evil disposition, perverts the nature of the Spirits.

How it begins from the Spirits and the Animal Government.

That *Melancholy* doth very often arise from the Animal Government, every common body doth sufficiently note; to wit, forasmuch as the Animal Spirits conceive inordinations from violent passions of the mind, in which, when they remain long, they bend the whole Soul, yea and the Body, from their due temper and constitution: So especially destroying Love, vehement sadness, panick fears, envy, shame, care, and immoderate study, are wont oftentimes to excite this Distemper. For by reason of these kinds of occasions, the Animal Spirits being thrust down, beyond their wonted paths of expansion, and remaining in their error, by reason of the assiduity of Passion, at last they go into these deviating tracts, which afterwards observing, they are hardly reduced into their former due ways. Then, forasmuch as for that reason, the motion and vigoration of the Heart (as hath been shewed) is lessened; therefore the Blood is defective in its due temper, and sanguification, and is from thence made more fixed and *Salino-sulphureous*, and the Animal Spirits coming from it, are but degenerate into a sourness; and so the Blood being depraved by the latter, encreases to the *Melancholick* disposition, begun from the Spirits.

By what means this Disease arises from the Blood.

No less often doth it come to pass, that the seeds of *Melancholy*, being at first laid in the Blood, do at length impart their evil to the Spirits: For this reason, some are made obnoxious to this Disease from their Parents. But an inordinate living, long intermission of wonted exercise, usual evacuations, as of the Menstrual Blood, or the Piles, or bleeding at the *Hamorrhoidal* Veins, also the Seed, or the Serous Matter, being suddenly suppressed, and many other occasions, easily infect, and foul the Blood, and render it *Melancholick*; whose depraved disposition is of necessity communicated to the Spirits.

Melancholy doth not arise from an atrabilary humour heaped up in some place or mine.

But we cannot here yield to what some *Physicians* affirm, that *Melancholy* doth arise from a *Melancholick* humor, somewhere primarily and of it self begotten, and they assign for its birth, several places, to wit, the Brain, Spleen, Womb, and the whole habit of the Body; for besides, for that no such mines of such an humor appear, unless perhaps some be planted in the Spleen; moreover the Blood it self is it, which conceives at first the *Melancholick* intemperance, or any other by it self, and then deposes the Recrements of the same nature, in proper emunctories or receptacles. For neither is the yellow Bile or Choler laid up in the Gall-Bladder, or the black Bile so called, or *Melancholick* humor in the *Spleen*, unless the bloody Mass begets those humors before hand: If at any time these, or other Recrements, being any where laid up, are received of the Blood, they produce its effervescency or growing hot, but not presently or easily its intemperature.

By what means according to the Antients, it is said to arise from the Head.

Therefore, because sometimes the original of *Melancholy* is ascribed to the Head, and the intemperature of the Brain from these, to wit, too hot, and accused to be from those, too cold, I rather think it ought to be affirmed, that this Distemper doth sometimes at first begin from the Brain, and the Soul dwelling in it: because *Hippocrates* also plainly asserts it, 6 *Epidem. Sect.* 8. *T.* 58. For distinguishing *Epileptical* and *Melancholick* persons, being made so together, or else successively, as to the formal reasons of the Diseases, he saith, *The defluxion which floweth from the Brain, from the ill affection, state, or temperament thereof, if it flows into the Body causeth the Falling-sickness; if into the cogitation or the mind, Melancholy.* So in *Melancholy* he grants, the Soul distinctly, and as it were apart from the Body, or Brain, to be affected.

How from the Womb.

Secondly, Because sometimes the original of this Disease is deduced from the Womb, it is not to be thought, that the *Melancholick* humor is there at first generated, but the occasion of *Melancholy* doth proceed from thence; either bacause the whole Blood being infected, and made degenerate by reason of a stoppage of the *Menstrua*, strives to go into a *Melancholy Dyscrasie* or intemperature; or because, by reason of the provocations of *Venus* or Lust, being restrained, not without great reluctancy of the Corporeal Soul, the Animal Spirits being for a long time forced, and restrained, become at length more fixed and *Melancholick*.

How from the Spleen.

Thirdly, It is a common opinion, and also ours, that sometimes *Melancholy* is either primarily excited, or very much cherished from the Spleen, being evilly affected, and so from thence is called by a peculiar word, *Hypochondriack*; as we have shewed at large in another Tract of Convulsive Diseases. But the Blood is first in fault, begetting

ting in it ſelf from the beginning *Melancholick* foulneſſes, depoſes them in the Spleen, which receiving again, after their being exalted into the nature of an evil Ferment, is more vitiated in its diſpoſition, by their foulneſs.

Fourthly, But beſides, it is ſaid, there is another kind of *Melancholy*, diſtinct from the *Hypochondriack*, and the former, that is begotten in the whole Body together; this is nothing elſe, than the Maſs of Blood being degenerated from its true nature, by reaſon of errors in the ſix non-naturals, and for many other occaſions, doth acquire an *Atrabilary* or *Melancholick* diſpoſition; that is, where the Spirit being depreſſed, the *Sulphureous* Particles, together with the *Saline*, and alſo with ſome *Earthy*, are carried forth; for the *Melancholick* diſpoſition of the Blood is very much a-kin to this *Sulphureous-ſaline*, which we have ſhewed oftentimes to excel in ſome kind of *Scurvy*. For what cauſes, and upon what occaſions, this is wont to be produced, may be ſufficiently known from the *Ætiology* of that Diſeaſe, being at large explained. *How from the whole Body.*

The differences of this Diſeaſe may be eaſily gathered from what hath been ſaid: for in reſpect of its firſt ſubject, which is ſometimes the Soul, ſometimes the Body, or rather the Blood, it is called either Animal or humeral *Melancholy*. Again, it is impreſſed according to that, with various powers, to wit, it is firſt impreſſed either on the Rational Will, or the ſenſitive, concupiſcible, or iraſcible Appetite; alſo it is divided into very many kinds, as it is employed about diverſe things, to wit, either Sacred, or Magical, or Humane, the huge cenſe or bead-roll of which is almoſt infinite; the chief of which, that are wont to come within the Cure of Medicine, are Religious, Amorous, and Jealous *Melancholy*. *The Differences of the Diſeaſe.* *1. In reſpect of its firſt Subject.*

2. By reaſon of the temperament of the ſick, according to which, the Particles of the *Melancholick* blood, being made ſometimes *Sulphureous*, ſometimes Saline or Earthy, the Spirituous being depreſſed, are exalted more or leſs, a *Delirium*, or ſadneſs, fury, or ſtupidity, are more or leſs variouſly joined to *Melancholy*. *2. By reaſon of the Temperament of the Sick.*

3. The Diſeaſe is either continual or intermitting, according to the conjunct cauſe, either ſtronger, both the *Hypoſtaſis* of the Spirits, and alſo the bloody Maſs, being both together vitiated; or elſe lighter, and leſs deeply fixed; ſo that the Diſtemper'd ſometimes are well enough for many days or months, yet apt to relapſe upon any great occaſion. *In reſpect of the next Cauſe, as it is ſingular, or conjunct.*

4. In reſpect of the hurt Imagination, there are very many types of *Melancholicks* to be met with, yea almoſt innumerable; yet the chief difference of which is, that ſome are delirious in all things, and others in one thing only. *In reſpect of the Imagination diverſly hurt.*

The *Prognoſtick* of this Diſeaſe, though as to health or death, it is for the moſt part ſafe; yet by reaſon of the event, it is very uncertain: For ſome quickly grow well, others not of a long time, and others are never cured. *The Prognoſtick of this Diſeaſe.*

This Diſtemper ſuddenly excited, from a ſolitary evident cauſe, as a vehement Paſſion, is far ſafer than by leaſure invading, after a long *Procatarxis* or foregoing cauſe. For the former, if the evident cauſe be preſently removed, often ceaſes of its own accord, or with a little help; but in this latter, for that the Maſs of Blood, and the whole heap of Animal Spirits, are departed from their due diſpoſition, and not rarely the conformation of the Brain, as to the tracts of the Spirits, is altered; The Cure very difficultly, and not under a long time ſucceeds.

Melancholy being a long time protracted, paſſes oftentimes into Stupidity, or Fooliſhneſs, and ſometimes alſo into Madneſs; further, ſometimes it brings on Convulſive Diſtempers, or the *Palſie*, or *Apoplexy*, yea ſometimes a violent Death.

As to the Cure, there is little or no hopes, if the Diſtemper'd being very contumacious and refractory, reject all Medicines, and every method of Phyſick. Further, there is ſcarce any better thing to be expected from them, who lying ſick with only imaginary Diſeaſes, take all Remedies, and require ſtill more, and of diverſe kinds, to be given them.

As the Cure of *Melancholy*, as it is always difficult and long, ſo it is wont to be mighty intricate and perplexed; for that it ought to be diverſly and variouſly inſtituted, in reſpect of the evident, *Procatartick*, and Conjunct cauſes of its kind, alſo by reaſon of the *Symptoms* daily ariſing. Neither is it only behoveful oftentimes to change the Remedies, and Method of healing, but alſo variouſly to make uſe of between whiles, warnings, deceits, flatteries, intreaties, and puniſhments. *The Cure of the Diſeaſe.*

But firſt of all, the Evident Cauſe of this Diſeaſe, if any noted thing went before, ſhould be inquired into; and if it may be, either preſently removed, or elſe its removal to be in ſome ſort feigned. Further, the affections of the mind being vehement, and ſtirred up from thence, are either to be appeaſed, or ſubdued by others oppoſite. Wherefore, to deſperate Love ought to be applied or ſhewed indignation and hatred; Sadneſs is to be oppoſed with the flatteries of Pleaſure, Muſick, a deſire of vain glory, *The evident Cauſe firſt to be removed.*

or alſo a *pannick* terror. In like manner, as to the reſt of the Paſſions, you muſt proceed to quiet, or elude them.

Three primary Indications.

The *Curatory* Method, accommodated for the healing of *Melancholy*, ſuggeſts many other Indications, the chief of which, and to which the reſt may be the better placed, are theſe three, commonly noted, *viz. Curatory*, which reſpects immediately the Diſeaſe, and its Conjunct Cauſe; *Preſervatory*, which cuts off the *Procatartick*, and Evident Cauſes; and *Vital*, which is imployed about conſerving of ſtrength.

1. *Curatory.*

As to the firſt Indication, the intention of the *Phyſician* is ſo much to lift up, make volatile, and corroborate the more fixed or dejected Animal Spirits, that being alſo apt to go backwards, or out of the way, that afterwards they may irradiate more freely, being ſtretched forth, the whole Brain, with a full and not broken beam, for the Acts of the Imagination, Judgment, and other principal faculties; and ſo lively actuate the *Præcordia*, and make them to vibrate or beat ſtrongly, that the Blood being more plentifully inkindled, it may be projected from thence, without ſtop or ſtagnating, into the whole Body.

The healing of the Spirits, is beſt perſormed by admonitions and artificial inventions, concerning the buſineſs of Life.

Therefore, for the healing of the Spirits, firſt of all it is to be procured, that the Soul ſhould be withdrawn from all troubleſome and reſtraining paſſion, *viz.* from mad Love, Jealouſie, Sorrow, Pity, Hatred, Fear, and the like, and compoſed to chearfulneſs or joy: pleaſant talk, or jeſting, Singing, Muſick, Pictures, Dancing, Hunting, Fiſhing, and other pleaſant Exerciſes are to be uſed. They who care not for Sports or Pleaſures (for to ſome *Melancholicks* they are always ingrateful) are to be rouſed up by imploying them in more light buſineſſes; ſometimes *Mathematical* or *Chymical* Studies, alſo Travelling, do very much help; moreover, it is often expedient to change the places of habitation, in their native ſoil. Thoſe who will ſtill ſtay at home, are to be warned, that they take care of their Houſhold affairs, and that they ſhould govern their Family; that they ſhould build Houſes, plant and order Gardens, Orchards, or Till the Ground. For the mind being buſied with neceſſary cares or duties puts aſide, and at laſt deſerts more eaſily, vain and mad cogitations. *Melancholy* perſons are ſeldom to be left alone, for that then they indulge their airy phantaſies and ſpeculations, and ſuffer them to continue longer. The Soul ſinks down inwardly, and leaving the body, enters into a certain *Metamorphoſis*, and puts on a new ſhape, and oftentimes different from humane manners. Wherefore, the Diſtemper'd ought to be diſturbed almoſt always with the diſcourſes of their familiar Friends; to wit, that the Animal Spirits, being called outwards, may be ſolicited from their diverſions, into their former and accuſtomed tracts. But if the ſick be ſeduced with phantaſtical illuſions, and imagine ſome prodigious things of themſelves, and firmly believe them; their mind is to be drawn from them, by artificial inventions; very many cauſes and examples of this ſort of Cure are to be found in Books, and a diſcreet Phyſician may inſtitute the like as occaſion ſerves.

Yet oftentimes there is need of Medicine beſides.

Although a freſh *Melancholy* may be cured ſometimes by the mere diſcipline and inſtitution of the mind and Animal Spirits, yet in a long or inveterate, where the Spirits have contracted an acetous nature, and the Blood an *Atrabilary* or Melancholick diſpoſition, and that the Brain is hurt, as to its Pores and paſſages: other Indications called Preſervatory are required, for the taking away of the *Procatartick* cauſes. Concerning this thing, the Medical intentions are firſt, that the Blood be reduced to a better temper, and genuine, to wit, a ſpirituous ſaline; then to enliven the Brain, and to render it bright and clear, its Pores being unlocked; and alſo to corroborate the Animal Spirits, and to excite them into a lively flowing forth. For which ends, the following method I think good to propoſe, which notwithſtanding ought to be varied, according to the various conſtitutions of the ſick.

The Preſervatory indication, concerning the Procatartick Cauſes of the Diſeaſe.

Phlebotomy.

The taking away of Blood has place almoſt in all *Melancholicks*, and ſometimes it is often to be iterated. For the aduſt and liveleſs Blood, being at times drawn away, a new and more ſpirituous comes in its place. Concerning the quantity, place, and manner of celebrating this Remedy, Authors have various opinions; but the motion and the affections of the Blood, being truly weighed, it will at firſt ſuffice to take a moderate quantity out of the Arm, and afterwards if need be, a leſſer, or to draw it from the Sedal Veins by Leeches. How the *Salvatella* Veins being opened (as is ſaid) ſhould bring ſuch notable help to *Melancholicks*, I confeſs I cannot underſtand: perhaps it may help them, if the *Melancholick* perſons be firmly perſwaded, that this *Phlebotomy* will cure them before any others: the frequent opening the *Hemorrhoidal* Veins, invites Nature to an indeavouring afterwards for that evacuation, which ſucceeding of its own accord (as *Hippocrates* ſays) does not ſeldom Cure this Diſeaſe.

Purging.

Purging, for that it draws back the nouriſhment of the Diſeaſe, from the firſts ways, and removes the impediments of other Remedies, ought to be celebrated at the begin-

ning,

ning, and repeated at intervals. But that ſome think, for the ſooner rooting out of this Diſeaſe, *Hellebore* or *Elateriums* are chiefly to be uſed, and cite *Hippocrates* for their Author; we apprehend, if the ſucceſs be minded, thoſe things do not ordinarily agree with, yea more often do hurt to the ſick: For indeed, more ſtrong Purgers do not take away the cauſe of the Diſeaſe, to wit, the *Dyſcraſie* of the Blood, but rather encreaſe it; beſides, they more debilitate and ſtrike down the Animal Spirits, before dejected. But *Hellebore* was ſo often preſcribed by *Hippocrates*, becauſe in his Age other *Cathartick* were ſcarcely known, or at leaſt they were not in frequent uſe: But now it is thought much better, gently to draw forth the receptacles of the humors, by more gentle and eaſie Purgers, and to cleanſe only the Viſcera and the firſt ways, without any great commotions of the Blood and Spirits.

Vomiting Medicines (as in moſt *Cephalick* Diſeaſes free from a Feavour) are wont to help after a peculiar manner in all mad Diſtempers. The reaſon of this partly conſiſts in this, becauſe the viſcous load of the Ventricle, which (as we have elſewhere ſhewn) doth very much burthen the Soul, being purged forth, the Spirits by that means being more free, expand themſelves more lively and chearfully. Further, foraſmuch as Vomiting preſſes together and evacuates the neighbouring receptacles of the humors, to wit, the *Gall*-Bag, the paſſage of the *Pancreas*, and the *Glandulas* of the *Meſentery*, procures that their contents be not transferred into the Head. *Vomiting.*

Take *Oxymel of Squills one ounce and a half, of Wine of Squills one ounce, of the Syrup de Peto two drams; mix them, and make a Vomit: if it doth not work, or but ſlowly provoke Vomiting with a great deal of Carduus Poſſet-drink.* *Vomitories.*

Take *of the Decoction of the middle bark of Elder four ounces, of the Salt of Vitriol one ſcruple to two ſcruples, of Oxymel ſimple three drams; mix them, and take it after the ſame manner.*

To robuſt and well-ſet perſons may be given *of the Infuſion of Crocus Metallorum, or of Mercurius Vitæ*, alſo *the Emetick Tartar of Mynſicht, or the Sulphur of Antimony.*

Take *of the Root of Polypodium of the Oak half an ounce, of Epithimum three drams, of Sena half an ounce, of Tamarinds ſix drams, of the ſeeds of Coriander three drams, of yellow Saunders two drams; let them be boiled in fourteen ounces of Spring-water, till it comes to ten ounces; adding to the Colature, or when it is ſtrained, of Agarick two drams, of Rhubarb one dram and a half, being clarified, add of the Syrup of purging Apples two ounces; let ſix ounces be taken, and repeated within three or four days.* *Purgers.*

Take *of the beſt Sena three drams, Epithym, Rhubarb, each one dram and a half; of Yellow Saunders half a dram, of Coriander ſeed two ſcruples, of the Salt of Wormwood half a dram, of Celtick Spike a ſcruple; put theſe into white Wine, and the Water of Pipins, of each four ounces, kept cloſe all night; to the liquor being ſtrained five ounces, add of the Syrup of Epithimum ſix drams, of Aqua Mirabilis two drams; mix them and make a Potion. In ſtrong bodies or hard to work on, may be added to theſe, of the ſtrings of black Hellebore macerated in Vinegar one dram or two.*

For thoſe who had rather make uſe of Pills, Boluſes, Powders, or Syrups, take the following.

Take *of Pil. Tartar of Quercitan, or of Amber of Crato half a dram, of the Reſine of Jalap or of Scammony ſix or eight grains, of Tartar vitriolated half a ſcruple, of Ammoniacum diſſolved in Aqua Mirabilis, what will ſuffice to make a Pill: let four be taken going to ſleep, and unleſs they work firſt, one in the morning following.* *Pills.*

Take *of Calamelanos, of the extract of black Hellebore, each one ſcruple; of the Reſine of Jalap ſix grains, of Ammoniacum ſolut. what will ſuffice; make four Pills, let them be taken with Government.*

The Powder of Haly, the Powder of Valeſco de Tarenta, of Peveda and others, are very much commended. And indeed in Country bodies, or robuſt, this Cathartick may ſeem convenient. Take *of Epithimum half an ounce, of Agarick, Lapis Lazuli, each three drams, Scammony one dram, Cloves thirty; make a Powder: the Doſe is from half a dram to a dram.* *Powders.*

Take *of the Powder Diaſenna, of Diaturbith with Rhubarb, each half a dram; make a Powder: let it be taken in a draught of Poſſet-drink, in a Decoction of Epithimum ſimple four or five ſcruples.*

Take *of the beſt Senna two ounces, of the Roots of Polypodia of the Oak two ounces, of Epithimum one ounce and a half, of yellow Citrons half an ounce, of Tamarinds one ounce, of Coriander ſeeds ſix drams, boil them in Barnet water four pints, till half be conſumed,* *Syrups.*

ſtrain it, and let it be evaporated in a warm Bath, to the conſiſtence of a Syrup, adding towards the end, of pure Manna, and of white Sugar, each four ounces; make a Syrup: the Doſe is two ſpoonfuls or three, in three ounces of ſome convenient diſtilled water, or in any other liquor. Or,

Take *of the ſame liquor evaporated to the conſiſtence of Honey ſix ounces, of freſh Caſſia four ounces, of the jelly of Currans two ounces, of Cream of Tartar, of the Salt of Wormwood, each one dram and a half; of the Powder of Diaſen. two drams, of yellow Sanders powder'd two drams; mix them and make an Electuary: Doſe three drams to half an ounce.*

Altering Medicines are of the greateſt moment;

Purging is not to be uſed continually, nor too frequently, yea it ſuffices that it be adminiſtred within ſix or ſeven days ſpace, and at other times, let the belly be taken down by Clyſters, if it be bound. As to other Medicines, which are not evacuators, though the Ancients relied not much upon them, we put our greateſt confidence of Cure in them. For they (to whom alſo many moderns conſent) thought there was nothing more to be done for the curing of *Melancholy*, than to Purge forth the *Melancholick* humor; wherefore, making Purges their chiefeſt buſineſs, they inſtituted the other Medicines called Preparatory, only for the ſake of this, to wit, making it their ſcope, that as ſoon as the humor being reduced to a fit conſiſtency, by altering Medicines, and that the ways for its excretion were open enough, then that it ſhould be carried forth of doors by Purgers. Which kind of *Hypotheſis* ſeems not agreeable, neither to reaſon, nor to Medical experience; becauſe *Melancholick* people rather receive hurt than help by often Purging, how methodically ſoever it be inſtituted. Therefore, we, placing the cauſe of this Diſeaſe in the Dyſcraſie of the Blood and Spirits, and in the weakneſs or evil conformation of the *Viſcera* and the Brain, eſteem altering and corroborating Medicines to be in the firſt rank for Remedies, and for the ſake of theſe, that Purgers may be uſed ſometimes between whiles. Therefore Purging being rightly preſcribed at due intervals, for the removing impediments, as to the reſt you may proceed according to theſe forms.

and not purging Medicines, as the Antients thought.

An Electuary. Take *of the Conſerves of the flowers of Gilliflowers, and of Borage, each two ounces and a half; of the rinds of Myrobalans preſerved ſix drams, of Coral prepared, and of Pearl, each one dram and a half; of Ivory, and Crabs Eyes, each one dram; of Confection de Hyacintho two drams, of the Syrup of Coral and red Poppy what will ſuffice; make an Electuary: take two drams Morning and Evening, drinking after it three ounces of the following Julep, or the diſtilled Water.*

A Julep. Take *of the water of the Flowers of Cowſlips, and of black Cherries, each ſix ounces; of Balm four ounces, of Dr.* Stephens *his Water two ounces, of Sugar ſix drams; mingle it and make a Julep.*

A Diſtilled Water. Take *of the leaves of Balm, Borrage, Bugloſs, Fumitory, Water Creſſes, and Brooklime, each four handfuls; of the flowers of Pinks, Marigolds, Borrage, and Cowſlips, each three handfuls; the outer rinds of ſix Oranges and ſix Lemons, being all cut and bruiſed, pour to them Whey made of Cyder eight pints; diſtil it in a common Still, and mix all the liquor together.*

Lozenges. Take *of the Powder of Pearl, of Ivory, of Coral prepared, each two drams; of the Species Lætificant (or making merry) of Diarrhod. Abbatis, each one dram; of the Oyl of the rind of Citrons half a ſcruple, of white Sugar, diſſolved and boiled to the conſiſtence of Lozenges, in what will ſuffice of Balm Water, ſix ounces; make Lozenges according to art, weighing a dram: take two or three at nine of the Clock in the Morning, and at five in the Afternoon, drinking after it a draught of the diſtilled Water or of Tea.* Or,

An Apozem. Take *of the Roots of Chervil, of Polypodium of the Oak, each one ounce and a half; of the leaves of Harts Tongue, Ceterach, Scolopendria, Germander, each one handful; of Tamariſk half a handful, of the bark of the ſame half an ounce, of Raiſins of the Sun ſtoned two ounces, one Apple cut; let them be cut and bruiſed, and boiled in four pints of Spring-water, to the conſumption of a third part; about the end add of the leaves of Water Creſſes one handful, let it be ſtrained and clarified: take of it ſix ounces twice or thrice in a day; ſweeten it with Syrup of Fumitory.*

Spaw-Waters. Spaw-Waters coming from Iron, are wont oftentimes to give great benefit for the Curing of *Melancholicks*, to wit, becauſe they being plentifully drunk, waſh out *ſalino-ſulphureous* Tincture of the Blood, and deſtroy its evil ferment. Moreover, they wipe clean the filthineſs of the Viſcera, unlock obſtructions, and what is of great benefit, they corroborate, by their aſtriction, both the weak and too looſe *Viſcera*, and alſo ſhut up the little mouths of the gaping Veſſels of the Brain, by which a paſſage lay open into

into it for the extraneous matter, together with the nervous juice. And for this reason, to wit, by corroborating the Viscera, and by locking up the passages of the Head, *Vitriolicks* prepared of Iron are wont to be given profitably in *Melancholy*, and also in the *Vertigo*.

Chalybeates.

Take *of our Steel prepared three drams, put it into a quart of the Water above described, take of it three or four ounces twice in a day, by it self, or with any other solid Medicine.*

Steeled Medicines.

Take *of the filings of Iron one ounce, put it into a glass with the juice of Oranges two ounces; let it stand for a day, shaking it sometimes, then pour to it of the Water of Pipins, and of White Wine, each one pint; or of the more thin and sweet Cyder one quart: take of it three ounces, twice in a day, after the same manner.*

Take *of the Vitriol of Steel, of the Cream of Tartar, of Crabs Eyes, each one dram; mix them; make a Powder, and let it be divided into nine parts: Take one part every Morning in a draught of the distilled Water, or the Decoction, or in a proper Broth.*

Take *of the Syrup of Steel four ounces: take of it one spoonful twice in a day, in a proper Vehicle.*

Take *of the Extract of Steel, of our Steel prepared with a proper Decoction three drams, of the Powder of Ivory, of yellow Saunders, of Lignum Aloes, each half a dram; of the Salt of Tartar two scruples, of Ammoniacum dissolved in the Water of Worms what will suffice to make a mass; let it be made into small Pills; let three or four be taken every Evening, drinking after it three ounces of the water of Apples, or of Cowslip flowers.*

Whey.

Whey, if it agrees with the stomach, being drunk very plentifully, for many days, for the same reason as Spaw-*waters*, viz. *by washing out the Salt, and Sulphureous particles of the Melancholick blood, is often given with success. Whey with Epithimum infused in it, or boiled in it, is highly praised by some.*

Broths.

Let Broths be made of a boiled Pullet, with the roots of Polypodium, Chervil, Fenil, Butchers Broom, and the leaves of Ceterach, Harts Tongue, Scolopendria, &c. take a draught of it in the Morning, and at five of the Clock in the Afternoon, in which dissolve of the Vitriol of Steel six grains, to ten of the Salt of Wormwood, and of the Cream of Tartar, each a scruple.

Juices of Herbs.

The Juices of Herbs and their expressions bring sometimes notable help to the taking away the Discrasie of the Blood. Take *of the leaves of Borage, of Water-Cresses, each six handfuls; two Apples pared, the Pulp of two Oranges, and of white Sugar one ounce; let them be all bruised together, and pour to them of the best Cyder a pint and an half; make an expression very strongly, and let it be kept in a glass. The Dose is four ounces twice or thrice in a day.*

A Bath.

In the Summer time, a Bath of sweet water, for that it wipes away the filth impacted in the Pores of the skin, and moves transpiration insensibly, is very profitable to some.

Hypnoticks.

Because *Melancholick* persons sleep but badly, and from long and frequent waking become worse, therefore *Anodynes*, and sometimes the more gentle *Hypnoticks* (when there is need) may be prescribed to be taken late at night, for this end are convenient, a Decoction of Cowslip flowers, or of the leaves of Lettice, or the water of red Poppies, or the Syrup of the same: Further, Emulsions of the Seeds of the white Poppy, of the Syrup *de Meconio*, and others that are only agreeable and cherishing of the Spirits.

As there is an infinite Company of *Melancholicks*, as well as of *Fools*, therefore we shall illustrate our *Hypothesis* with two Examples only, in one of which the Disease begins from the sensitive part of the Soul, or the Animal Spirits; and the other from its Vital part, to wit, from the Blood.

The first History.

Sometime since, a noted person about forty years of Age, of a florid countenance, chearful, and nimble about any business, being afflicted in his mind, by reason of a certain affair, and very much dejected, he became thereupon very sad, *Melancholick*, and with a dark and cast down countenance. When I went first to visit him, he complained of a manifold hurry and distraction of thoughts, which were so many, that he was busied in his Phantasie almost night and day continually, he lived without any sleep: Nor were these cares concerning the commonweal, or the proper business of his Family; nor about the health of his Soul, or of his Body, was he at all solicitous; but was rather troubled perpetually about small matters, and of no moment. He was so fearful of all things, that he presaged loss or death immediately to happen to him, upon every small accident. And lastly, he was so sad, as if he would contend in weeping with *Heraclitus*. Further, he laboured with such a straitness of Heart, and so great a constriction, that he seemed to feel all his *Præcordia* to be drawn together like a Purse, and

An Example of Melancholy beginning from the Spirits.

and he thought that there ſtill lay there an immenſe burthen, and mighty weight; under which he imagined he could not go, unleſs ſtooping towards the Earth. Whilſt he talked, and diſcourſed with his Friends, this conſtriction of the *Præcordia*, and the weight did ſomewhat remit; but then again, they were wont to be repeated more vehemently, ſhaking for fear at any unaccuſtomed object: Nor did he labour only in his *Præcordia*, but with a certain conſtriction in his whole Body beſides, and as if a certain burthen lay on the region of his Loins, and alſo on his ſhoulders and arms.

The cure. The reaſons of theſe *Symptoms* are clear enough from our *Hypotheſis*. As to the Cure, after various Medicines being given, without any ſucceſs, I at laſt perſwaded, becauſe it was then Summer time, that he ſhould drink of our Artificial *Spaw* Waters, for a fortnight: Therefore, firſt two quarts of Spring-water being poured upon half a dram of our prepared Steel, for a night, and afterwards as much in four quarts of water; the ſick man every morning drunk the clear liquor, and within four or five hours he rendered the greateſt part of it by Urine: He took beſides, going to ſleep and early in the morning, a Doſe of an appropriate *Electuary*, (ſuch as is above deſcribed) with a *Cephalick Julep*; within two months he became much better, and afterwards by degrees returned to himſelf.

The ſecond Hiſtory.
An Example of Melancholy ariſing from the Blood.

Whilſt I was writing theſe, a young Noble man, being lately returned from his Travels beyond Sea, and becoming unhealthy, put himſelf upon our care. This perſon being formerly indued with a Sanguine and chearful temperament, ſplendid in his appearance, as alſo with an acute wit, and of a ready ingenuity, whilſt he travelled in the Countries abroad; but one Summer living in *Spain*, he felt a great alteration in himſelf, from the great heats in that place: for firſt of all, from the frequent heatings of his Blood, he became obnoxious to an heat ariſing in the palms of his hands, and in the bottoms of his feet, with prickings over all his body, which in a ſhort time vaniſhed. Then he found him ſelf very bad as to his Appetite and Sleep; moreover being dull and ſad, he began not to mind, yea ſometimes to avoid any pleaſant buſineſs, or the converſe of his Friends. At length his indiſpoſition daily increaſing, without any evident cauſe, or real trouble of mind, he became *Melancholick*, ſo that being ever thoughtful, fearful, and ſad, nothing could delight him; for his ſtudies, exerciſes, travelling, converſation with learned men, or any other thing which he before delighted in, now became to him a trouble and a terror. After this manner being diſtemper'd for two years, he was ſo changed from himſelf, as if he were another Man. For his Cure he had conſulted the moſt skilful Phyſicians in *Spain*, *France*, and *Holland*, and laſtly in *England*, and had tryed ſeveral methods of healing almoſt without any benefit. The *Melancholick* diſtemper of his blood, at firſt contracted by the intemperature of the Air, ſtill remaining, and afforded to the Animal regiment, Spirits as it were acetous, that is ſuch as we but now deſcribed. To this Noble man, at the beginning, we thought good to recommend theſe following Remedies.

The Curatory Method propoſed.

Take *of the Decoction of Senna Gerionis (with Tamarinds half an ounce) four ounces, of the Syrup of purging Apples one ounce, of Aqua Mirabilis two drams; mix them, and take it with government, repeating it within nine days. After Purging let Blood be taken away with Leeches, about four ounces.*

Take *of our Syrup of Steel ſix drams, take a ſpoonful in the morning, and at five of the Clock in the Afternoon, in the following liquor three ounces, walking after it for an hour or two.*

Take *of the leaves of Balm, Borrage, Bugloſs, Pimpernel, Elm-tree, Harts Tongue, Water Creſſes, each four handfuls; of the Roots of Borrage half a pound, of Pinks and Marigold flowers, each three handfuls; the outer peels of eight Oranges and four Lemons, of Mace half an ounce; theſe being cut and bruiſed, pour to them of Whey made of Cyder eight pints; let them be diſtilled in common Stills.*

Take *of the Conſerves of Gilliflowers, Betony, Borrage, each one ounce and a half; of Pearl powdered two drams, of red Coral prepared one dram and a half, of the Species Confect. de Hyacintho two drams, of the Syrup of Coral, and red Poppies, each, what will ſuffice: make an Opiate to be taken going to ſleep every night, the quantity of a Cheſnut, drinking after it of Cowſlip flower water two or three ounces.*

After ſixteen or twenty days, changing the method of altering Medicines, the following things were uſed in their places.

Take *of the Powder of Ivory, Pearls, red Coral prepared, each two drams; of male Pœony roots one dram and a half, of the Wood-Aloes half a dram, Lozenges made out of Oranges four ounces, of the ſolution of Tragacanth made of Balm Water, what will ſuffice: make Troches weighing half a dram: let him eat four in the Morning, and at five in the Afternoon, drinking after them a draught of Tea.*

Take

Take *of the ſame Powder without the Lozenges half an ounce, of the flowers of Sal Armoniack, and of Salt of Coral, each one dram; with Turpentine of Chio ſix drams, make a Maſs: take half a dram Evening and Morning, drinking after it of the diſtilled water three ounces.*

His food was only good and eaſily digeſted meats: he drank ſmall Ale, with the leaves of Harts-tongue infuſed in it. He taſted ſometimes a little Water and Wine, or Cyder, and he was almoſt continually employed, ſometimes in ſome eaſie affairs, ſometimes in moderate exerciſes, or in ſeveral ſorts of recreations.

Univerſal Melancholy.

Thus much concerning univerſal *Melancholy*, by which the ſick are affected almoſt indifferently by any object, ſo that they are intangled in every place, and by any accidents and circumſtances, with a multitude of thoughts continually, with raving, fear, and ſadneſs. We have largely enough handled the *ſymptoms* of this Diſeaſe being manifold, and the reaſons of them, partly in this Chapter, and partly in another Tract.

De Morbis Convulſivis, Cap. 2.

Particular Melancholy,

It is called ſpecial *Melancholy*, when the ſick reſpect a certain particular thing, or ſome kinds of things, of which they think almoſt without ceaſing; and by reaſon all the powers and affections of the ſoul being continually imployed about this one thing, they live ſtill careful and ſad; moreover, they have abſurd and incongruous notions, not only about that object, but alſo concerning many other accidents and ſubjects. In this Diſtemper, the Corporeal Soul, bending from its proper kind, aſſumes a certain new one, but not being conformable, either to the Rational Soul, or to the Body, or to it ſelf, it enters into a certain *Metamorphoſis*.

is excited by reaſon of two ſorts of Affections concerning Good or Evil.

This kind of Diſtemper, is produced by many ways, and on various occaſions; for vehement paſſions, deſire, fear, anger, pleaſure, yea all other paſſions both of the *concupiſcible* and *iraſcible* Appetite, being long continued, and carried forth to the height, are wont to excite the ſame. But there are two general occaſions, from which ſpecial *Melancholy* chiefly and moſt frequently doth ariſe; to wit, firſt, when there lyes a moſt heavy preſſure on the mind of ſome preſent evil, or an evil juſt at hand, whether it be true or imaginary: or ſecondly, if the loſs or privation of ſome good before obtained, or deſparing of ſomething wiſhed for or deſired, happen. In theſe oppoſite caſes, the Corporeal Soul being either drawn forth outwardly, omits all domeſtick care, either of it ſelf, or of the Body, or of the Rational Soul: or being preſſed inwardly, it relinquiſhes or perverts the offices of Reaſon, and of both the Vital and Animal Functions. It would be an huge work to enumerate the various caſes in either kind, and their ways of affecting; out of the great plenty, which being of the greateſt moment, ſeem to require the care of a Phyſician, are chiefly *furious Love, Jealouſie, Superſtition, deſpair of Eternal Salvation*, and laſtly the *imaginary Metamorphoſis* of the Body or its parts; and the good and evil phantaſticks of fortune; of theſe, ſeverally, we ſhall ſpeak briefly.

Love-Madneſs.

Concerning the power of Love, ſaying nothing here of ſome moſt noble Lord, or Heroick actions, (which appear chiefly on the ſtage of the *Theatre*, and on that of humane life) it is a moſt common obſervation, that if any one being taken with the aſpect and converſation of any Woman, begins to deſire her and to grow mad for her inwardly, and for his moſt devoted affection has nothing but loſs and contempt allotted him, unleſs he be very much ſupported by a firm reaſon, or is averted as it were by other croſs affections, there is great danger leſt he falls into Melancholy, Stupidity, or Love-Madneſs; with which paſſion, if by chance he be diſtemper'd, he forthwith ſeems transformed from himſelf, as it were into an animated ſtatue, he thinks on, nor ſpeaks of any thing but his Love; he endeavours to get into her favour, with the danger of both the loſs of his Life and Fortune; in the mean time, he not only neglects the care of his houſhold affairs, or of the publick, yea his own health, but becoming deſperate of his deſires, he oftentimes lays violent hands of himſelf: But if he be content to live, yet growing lean, or withering away both in Soul and Body, he almoſt puts off man; for the right uſe of reaſon being loſt, omitting food and ſleep, and the neceſſary offices of Nature, he ſets himſelf wholly to ſighing and groaning, and gets a mournful habit and carriage of body.

The Reaſons of Symptoms in mad Love.

If we ſhould inquire into the reaſon of this Diſtemper, it eaſily appears, that the Corporeal Soul of Man being obnoxious to violent affections, when it is wholly carried into the object moſt dear unto it ſelf, *viz.* the beloved Woman, and cannot obtain and embrace her, there is nothing beſides that can quiet or delight it; yea being refractory, it grows wholly deaf to the Rational Soul, and hears not its dictates, but carrying only tragical notions to the Imagination, darkens the ſight of the intellect. Further, foraſmuch as the *Præcordia* (the more plentiful afflux of the Spirits being

ing denyed to them) do ſlacken of their motions, the blood heaped up in the boſoms of the heart, and apt to ſtand ſtill, ſtirs up a great weight and oppreſſion, and for that reaſon, ſighs and groans; in the mean time the face, and the outward members grow pale and languiſh, for that the affluence of the Blood and Spirits is withdrawn: Hence in our *Idiom* or Speech, the Heart of deſpairing Lovers is ſaid to be broken, to wit, becauſe this Muſcle is not lively enough actuated by the Animal Spirit, and ſo is ſhaken weakly and ſlowly, and doth not amply enough caſt forward the blood with vigor, into all parts. Indeed in Love, the Corporeal Soul intimately embracing the *Idea* of its moſt grateful object, endeavours all it can to be joyned, and fully united to the ſame; emitting toward her, the roots of the affections, with which it is moſt ſtrictly enfolded, ſeems from thence to draw its chiefeſt life and growth; ſo that the body being neglected, when as it inclines it ſelf wholly towards the thing beloved, if by chance being broken off from this union, it ſuffer a divorce, like a plant taken out of its natural ſoil, for that it does not receive any more, or aſſimilate food convenient for it ſelf, it ſoon withers: Hence the Animal Spirits leaving their accuſtomed offices, and wonted tracts of expanſion, do not actuate or irradiate either the Brain or the *Præcordia*, nor the nervous *Appendix*, after their due manner: wherefore, not only for the preſent an untrimmed, and a delirious diſpoſition of mind, with a mournful habit of body, are excited; but from thence the vitiated Blood, and the Spirits, having gotten an acetous nature, an habitual *Melancholy* is introduced.

Jealouſie. Such an inordination of the Animal Function as Mad-Love hath, about the acquiſition of its object, the ſame or very like hath *Jealouſie*, about the retention of the ſame, being gotten; ſo always (as well in the fruition as in the deſire) *Res eſt ſolliciti plena timoris Amor: Love is ever full of careful fear.* This Soul, if it be not ſecure of its moſt dear prey, it preſently grows hot, and pours forth darkneſs and clouds upon its own ſerenity: Then afterwards being infected by a *Cholerick* tincture, it receives every object, as if it were imbued with a yellow colour: for indeed, as the ferment of the ſtomach being too much indued with a ſourneſs, perverts all things that is put into it, into its nature; ſo *Jealouſie* being once ariſen, changes all accidents and circumſtances, into the food of its poiſon; and when the ſenſitive Soul, being as it were bowed inward in this paſſion, becomes not conform to its Body, for that reaſon the *Oeconomy* of the Functions both Animal, Vital, and vegetative being depraved, *Jealouſie* makes one rave, and to wither away.

Superſtition and Deſperation. Superſtition, and a deſpair of *Eternal Salvation*, are wont to impreſs on the *ſenſitive* Soul, the Blood, and the Body, almoſt the like Diſtempers of *Melancholy*, as *Love* and *Jealouſie*; but their way of affecting is ſomewhat different: for in thoſe the object, whoſe acquiſition or loſs is indanger'd, is wholly immaterial, and its affection being at firſt conceived by the Rational Soul, is impreſſed on the other Corporeal: In the proſecution of which, if ſhe eaſily obtains her deſires, then no perturbation of the humane mind ariſes; but if (as it often is wont to happen) the Corporeal Soul being oppugned or refuſed, it will not ſtand to the monitions of the Rational, but preſently growing hot, moves inordinately the Blood and Spirits, oppoſes the Corporeal goods and blandiſhments to the ſpiritual objects, from the intellect, and endeavours to draw the man to its ſide; and ſo whenas there is a continual skirmiſh between the two Souls, and that ſometimes the ſuperior Will, and ſometimes the ſenſitive Appetite prevails; at length the judgment ſeat of the Conſcience is erected by the mind, where every ſeveral action is ſcrupulouſly examined. By reaſon of this more frequent ſtrife of the Souls, the Animal Spirits being too much and almoſt perpetually exerciſed, and often commanded, and as it were drawn hither and thither into contraries, at length they depart ſomething from their vigor and their nature, and at length being made more fixed and Melancholick, for that they are detained from their wonted expanſion, cut unaccuſtomed and by-tracts in the Brain, and ſo induce a *Delirium* or idle raving, with mighty fear and ſadneſs. In this ſort of Diſtempers, the Corporeal ſoul being ſnatched as it were violently, departs both from it ſelf, and from the Body, and according to the characters of the impreſſed *Idea* being modified, it is wont to aſſume a new image, either Angelical or Diabolical; in the mean time, the Intellect, becauſe the *Imagination* furniſhes it only with undecent and monſtrous notions, is wholly perverted from the uſe of right reaſon.

The reaſon of the Symptoms.

The imaginary Metamorphoſis of Melancholick Perſons. By the like means of affecting, it happens that ſome *Melancholick* perſons undergo imaginary *Metamorphoſes*, as to their fortunes, or as to their bodies, *viz.* whilſt one imagines himſelf, and plays the part of a Prince, and another a Beggar; another believes that he has a Body of Glaſs, and another that he is a Dog, or a Wolf,

or

or ſome other Monſter; for after the Corporeal Soul's being diſtemper'd with a long *Melancholy* and the mind blinded, it wholly departs both from it ſelf, and alſo from the Body, and affects, and as much as in it lyes, truly aſſumes a new image or condition.

CHAP. XII.

Of Madneſs.

Madneſs and Melancholy are akin.

After *Melancholy*, *Madneſs* is next to be treated of, both which are ſo much akin, that theſe Diſtempers often change, and paſs from one into the other; for the *Melancholick* diſpoſition growing worſe, brings on *Fury*; and *Fury* or *Madneſs* growing leſs hot, oftentimes ends in a *Melancholick* diſpoſition. Theſe two, like ſmoke and flame, mutually receive and give place one to another. And indeed, if in *Melancholy* the Brain and Animal Spirits are ſaid to be darkned with fume, and a thick obſcurity; In *Madneſs*, they ſeem to be all as it were of an open burning or flame. But indeed, for that as we have already ſhewn, that the Animal Spirits being inkindled or inflamed do excite a *Phrenſie* with a *Feavour*, which is wanting in *Madneſs*, their affection will be better illuſtrated in this Diſeaſe, as well as in *Melancholy*, by the *Analogy* of *Chymical* Liquors.

The Subject of Madneſs are the Animal Spirits.

Whenever therefore *Madneſs* without a *Feavour* being excited, with a remarkable hurt of the animal Function, is wont to be permanent, and continue long, its next and immediate ſubject are the Animal Spirits; which acting not by conſent, nor from any force from another, but of themſelves, are habitually diſtemper'd, and depart from their proper and genuine nature, to wit, a *Spiritual ſaline*, into a *Sulphureous-ſaline* diſpoſition, like to *Stygian*-Water, as we have ſhewed above; therefore they perform only inordinate acts, and ſo perſiſt a long while to act amiſs or evilly. To this vice of theirs, perhaps the Brain, or the Blood, or other parts may contribute ſomewhat, but the Spirits themſelves are firſt and chiefly in fault.

The diſpoſition of which are like to Stygian *Water.*

Three chief Accidents in Madneſs.

It is obſerved in *Mad men*, that theſe three things are almoſt common to all: *viz.* Firſt, That their *Phantaſies* or Imaginations are perpetually buſied with a ſtorm of impetuous thoughts, ſo that night and day they are muttering to themſelves various things, or declare them by crying out, or by bauling out aloud. Secondly, That their notions or conceptions are either incongruous, or repreſented to them under a falſe or erroneous image. Thirdly, To their *Delirium* is moſt often joyned Audaciouſneſs and Fury, contrary to *Melancholicks*, who are always infected with Fear and Sadneſs. Theſe primary *ſymptoms* of *Madneſs* in the Animal Spirits, indued with the nature of *Stygian*-Water, may be thence moſt aptly deduced as appears clearly by what follows.

Which are alſo to be found in Stygian Water.

1. The Particles of this are always in motion.

For firſt, the Particles of *Stygian*-Water are highly active and unquiet, and in perpetual motion; hence the Effluvia's falling from them continually ſtrike the Noſtrils, and the Liquor being poured forth from the Veſſel, meeting with ſome other bodies grows very hot, and penetrates their Pores and Paſſages; the reaſon of which is, becauſe the *Saline* Particles being conjoyned with the *Sulphureous*, ſhake one another, and will not cohere with any of another kind. In like manner we may ſuppoſe that the Animal Spirits being ſtilled forth from the Blood; filled as it were with a *Nitrous ſulphur*, are indued with a notable mobility or unquietneſs; which, for that reaſon, being ſtretched forth from the middle of the Brain on every ſide, both in its compaſs and in the nervous *Syſtem*, and being from thence perpetually reflected, produce unbridled *Phantaſies*, and almoſt never interrupted, and alſo great and perpetual inordinations, both of the ſenſitive and loco-motive function.

And in like manner the Animal Spirits in Mad-men.

2. The Effluvia's of Stygian water, every where make new Pores and Paſſages.

Secondly, the *Effluvia's* exhaling from *Nitrous* or *Stygian* Spirits, do not ſo much evaporate from open ſpaces, but being very penetrating, cut every where new ones, almoſt in every ſubject, where they are able to break thorow; yea moſt bodies containing theſe kind of Spirits, or the things laid upon the mouths of the Veſſels, are ſo bored thorow by them, that they are preſently rendred friable or brittle, and fall into ſmall bits. In like manner we believe, that the Animal Spirits in the Diſtemper of *Madneſs*, becoming very moveable, and very much ſharpned, out of their morbid nature, do ſo likewiſe leave their former tracts of going and returning to and fro, and do cut for themſelves, every where in the Brain, new little ſpaces or walks,

In like manner alſo the Animal Spirits in Mad men.

and plainly devious; in which, whilſt they flow, they produce unaccuſtomed notions, and very abſurd, whence there is a neceſſity, that the diſtemper'd do ſpeak, and imagine for the moſt part incongruous and diſcompoſed things; at once confounding things paſt with things preſent, or to come; and contrary or oppoſite things.

3. The Effluvia's of Stygian Water are diffuſed far.

Thirdly, It is obſerved, that the vaporous little bodies falling away from the *Nitro-ſulphureous* Spirits of Minerals, do not only ſubſiſt in the neighbourhood, (as the breath exhaling from *acetous* Liquors) but are diffuſed very far, and on every ſide into remote places. I have often ſeen, when the Spirit of *Nitre* has been mixed with the Butter of *Antimony*, that the whole Chamber has been filled with a black ſmoke aſcending from thoſe *Stygian* Liquors: When *Aqua fortis* or the Spirit of *Nitre* being poured from the *Alembick*, or drawn forth by a gentle heat, a moſt ſharp vapor has pierced the Noſtrils and Lungs of thoſe ſtanding afar off; which certainly happens by reaſon of joyning together of the fluid *Salt*, and the raging *Sulphur*; the little bodies of either of which mutually incite one another, and ſo being combined together, are carried farther. Indeed, after the ſame manner it ſeems to be concerning the Animal Spirits in *Mad-men*, which, for that they are of the ſame nature as *Stygian* Water, quickly paſſing thorow both the frame of the Brain and its *Appendix*, cauſe the diſtemper'd not only to be furious, but as it were *Demoniacks* or poſſeſſed with the Devil; ſo that being free from any fear or languiſhing, they enter upon any thing boldly, and expoſe themſelves fearleſs to ſword or fire; alſo by reaſon of the prodigious putting forth of their Spirits, with a mighty ſtrength, they often break aſunder bonds and chains, and overthrow at once many ſtrong men, reſiſting and going about to reſtrain them.

In like manner as the Animal Spirits in Mad-men.

What the Conjunct Cauſe of Madneſs is.

The comparing of the Animal Spirits with *Stygian* Water, or the *Nitro ſulphureous* Spirit, clearly ſhews what is the conjunct or immediate cauſe of *Madneſs*; to wit, which ſeems to conſiſt, not ſo much in an aduſt bile or humor, or black and ſharp vapour, being ſuddenly ſuffuſed into the Brain, and inciting the Spirits inhabiting it into rage and fury; (for ſuch a vapour or humor either exhales of its own accord, or may be ſoon removed by the help of Remedies; and ſo the madneſs thence excited, would paſs away as quickly and as eaſily as the Fury or *Delirium* produced by the eating of wild Parſnips) but rather raging *Mad-men* are habitually ſo made, becauſe their Animal Spirits degenerate from a gentle and benigne nature, as alſo a ſubtil and very active diſpoſition, to wit, a *Spirituous-ſaline*, into another more ſharp, to wit, partaking of a fluid *Salt*, an *Arſenical Sulphur*.

How the Animal Spirits acquire a diſpoſition like to Stygian Water.

As to what belongs to the more remote or antecedent cauſes of *Madneſs*, *viz.* by reaſon of which the Animal Spirits acquire a moſt ſharp diſpoſition; before we come to theſe, we ought to ſhew how, and by what reaſon or means, a certain Corroſive *Latex* or water (ſuch as we ſuppoſe the Animal Spirits with its Vehicle to be) is begotten, and is able to ſubſiſt in the humane body.

It is ſhewed in the firſt place that corroſive and as it were Stygian Particles, are begot in the humane Body.

Truly, that moſt ſharp humors are ſometimes begotten in our bodies, plainly appears by many obſervations. We have elſewhere made mention of a Noble Man, grievouſly obnoxious to diſtempers of the Brain and Nerves, whoſe ſweat (when he was in a fit) preſently eat thorow his ſhirt, or made it ſo crumbling or friable, as if it had been dipt in *Aqua fortis*. It is an uſual thing for ſome to render by Vomit oftentimes as it were a *Vitriolick* water, corroding the coats of the *Oeſophagus* and the Palat. Further, *Cancrous*, *Scrophulous*, and *Peſtilential* Ulcers, ſhew a moſt ſharp humor, by which the fleſh and Membranes are eaten, as it were with *Aqua fortis*, with a blackneſs poured on them. Further it is obſerved, that Corroſive *Stagmas*, not chiefly brought forth in the Blood, are affixed to the muſculous fleſh, or to the *Parenchyma* of the *Viſcera*; but more frequently being procreated in the nervous liquor, being laid up with its *Latex* in the nervous parts, or their *Emunctories*, do produce *Apoſthums*, and *Pockey*, *Septick*, and other foul and filthy Ulcers. For theſe are moſt often excited in the *Glandulas*, or near the Tendons, or Membranes; and when as the humor falling away from them is firſt thin and watry, and afterwards becomes black very ſtinking, and corroſive; it is a ſign indeed, that the nervous Liquor it ſelf is changed into that ſort of putrefaction.

Wherefore the Nervous Liquor ſometimes becomes corroſive. Becauſe the volatile Salt moſt eaſily degenerates into an acid and moſt ſharp, with the acquired Sulphur.

It eaſily occurs, if the reaſon of theſe be inquired into, that the *Latex* watering the Brain and nervous *Appendix*, doth contain in it ſelf, together with a ſubtil Spirit, great plenty of volatile Salt. Therefore, when this is ſo depraved, that the Spirit being depreſſed, the Saline Particles degenerate into a flux, and acquire to themſelves little *Sulphureous* bodies, it becomes plainly Corroſive and *Stygian*. Wherefore, malignant humors and Ulcers chiefly happen in the nervons parts, and their *Emunctories*, and there are excited upon any light occaſion (as when a ſmall hurt happens to the Breaſt of a Woman, a *Cancer* follows) becauſe, indeed, the nervous humor being hindred ſomewhere in its paſſage, doth there ſtagnate, preſently the Spirit being depreſſed,

depreſſed, or flying away, the Saline Particles degenerating from a volatile to a four nature, get to themſelves ſoon after ſtrange companions, and ſnatching either Earthy or Sulphureous little bodies, or of ſome other kind, begin to congeal into *Scirrhous*, *Strumous*, or *Cancrous* Tumors. And when after this manner, by the ſtagnating of the nervous Liquor, and by its getting an heterogeneous concretion, the Mine of a Tumor is blown up in ſome part, and the ſupplements of the ſame liquor are continually perverted into the like nature of viciouſneſs; to which alſo happen, the *Melancholick* impurities, poured forth from the Blood, and other humors, which with their joined forces encreaſe the rage (even as when diverſe Salts and Sulphurs are deſtilled together) and conſtitute in the diſtemper'd part, a *Septick* matter, and like to the *Eſcharotick* or cruſting up of *Stygian* Water. According to this reaſoning or *Ætiology*, the irregularities of theſe kind of Tumors, as alſo the appearance of the Kings-Evil, are moſt aptly unfolded. If that the nervous Liquor ſo corroſive, and made degenerate, doth not grow into Tumors, flowing into the nervous Fibres, it is wont to cauſe here and there moſt cruel Pains and Cramps.

Hence the Reaſons of Tumours and Ulcers in the Kings Evil and the Cancer, are given.

But as this Liquor of the Nerves, being depraved after this manner, ſtirs up the aforeſaid Diſtempers in the nervous parts; ſo it is not difficult to conceive, that the ſame water, for that it is for a Vehicle of the Animal Spirits, flowing in the Brain, doth acquire, together with thoſe Spirits, a Corroſive and as it were a *Stygian* nature, and for that reaſon excites Madneſs. The depravation of the Animal Spirits, together with the juice watering the Brain, or the diſpoſition of Madneſs, is wont to ariſe after various ways and for diverſe cauſes; but truly, for the moſt part this Diſtemper (as we have obſerved of *Melancholy*) begins either from the Spirits themſelves, or elſe from the Blood.

Hence alſo the Madneſs of the diſtempered Spirits.

The Original of Madneſs either from the Spirits themſelves, or from the Blood.

Firſt, *Madneſs* beginning from the Spirits, ariſes ſometimes from an evident ſolitary cauſe, as a violent Paſſion; ſometimes alſo it proceeds from a foregoing cauſe lying in the Brain, as when it comes upon *Melancholy* or a *Phrenſie*. We ſhall a little weigh the reaſons of either caſe, and the various manner of their being made.

It begins for two occaſions from the Spirits.

1. As to the former, when a vehement affection puts any one beſides himſelf, that happens to be made thus; either becauſe the Animal Spirits are too much overthrown, and hurried into confuſion; or becauſe they are elevated above meaſure, and endeavour to ſtretch themſelves forth beyond their ſphere.

1. *By Reaſon of a violent Paſſion, by which*

Firſt, The Spirits are wont to be caſt down by a violent and terrible Paſſion; ſo it often happens, that ſome being ſtruck with a panick fear, by ſeeing a true or an imaginary Spectre or Ghoſt, afterwards fall into a perpetual Madneſs. Further, ſome by reaſon of ſome notable diſgrace or repulſe, others by reaſon of their hopes of obtaining their Love being ſuddenly and unthought of fruſtrated, and others by reaſon of a raſh breaking their oaths or vows, and violated Conſcience, being firſt highly troubled in mind, anon become Mad. The reaſon of which is, becauſe the Animal Spirits being driven beyond their orders and wonted paſſages, and put into confuſion, do make for themſelves new and devious ways, which entring into, immediately they bring forth delirious *Phantaſms*; in the mean time, the *Saline* Particles of the nervous juice, the ſpirituous being depreſſed, depart from their volatileneſs; and ſuffering a flux, aſſume to themſelves the *Sulphureous* little bodies poured forth from the Blood, into the then weak and open Brain; From whence this Liquor, being moſt ſharp like *Stygian* Water, and the Animal Spirits becoming fierce and very much incited, become furious.

They are either too much caſt down,

Secondly, Sometimes the Animal Spirits, whilſt they are too much elevated, almoſt after the ſame manner induce both to themſelves, and the nervous juice, the mad diſpoſition. Hence Ambition, Pride, and Emulation, have made ſome mad; the reaſon of which is, becauſe whilſt the Corporeal Soul ſwelling up with an opinion and pride of its own excellency, lifts up it ſelf, and endeavours on every ſide to expand or ſtretch it ſelf forth moſt amply, beyond the border or ſphere of its body, the Animal Spirits being tumultuarily called into the Head, will not be contained within their wonted bounds, but being there broken and diverſly reflected, by reaſon of their too much excretion, are compelled into new and plainly devious tracts; wherefore, both they being thruſt forth from the courſe of their proper emanation, and alſo the nervous Liquor, do quickly acquire a ſharp and incitative Diſpoſition, as was ſaid but now, for that reaſon *Madneſs* follows.

Or elevated above meaſure.

Thus much concerning Madneſs, excited by reaſon of a ſolitary evident cauſe; but this Diſeaſe doth alſo ariſe from a *Procatartick* cauſe, preexiſting in the Brain, andchiefly from *Melancholy* or the *Phrenſie* going before; in that the Animal Spirits with the nervous juice being a little more exalted, and in this a little more depreſſed, acquire the diſpoſition of Madneſs. As to the former, it is a vulgar obſervation, that ſudden and great *Melancholy* is for the moſt part next to Madneſs: the reaſon of which is, becauſe, when the

2. *Madneſs beginning from the Spirits ſucceeds Melancholy, or the Phrenſie.*

Animal Spirits, together with the nervous liquor, degenerate into a ſourneſs, are perverted, there only wants the acceſſion of *Sulphur*, by which they afterwards getting a *Stygian* nature, may induce *Madneſs*; (as when an acid Liquor diſtilled out of *Vitriol* or Salt, by the addition of *Sal Nitroſus*, becomes *Aqua fortis*) but indeed, in a great paſſion of *Melancholy*, becauſe the Spirits being diſturbed, the paſſages of the Brain are too open, the *Sulphureous* Particles carried from the Bilous and Rancid Blood, find an eaſie entrance, and ſo the former ſour or acid diſpoſition, turns into a *Stygian* or Maddiſh. Hence it is obſerved, if any one of a more hot temperament, falls into a *Melancholick Delirium*, with fear and ſadneſs, foraſmuch as the *Sulphureous* Particles in its humors, are joyned to the Salts being depreſſed into a flux, that ſadneſs and thinking at the beginning, very readily a ſhort time after becomes madneſs. Secondly, for that alſo a *Phrenſie* often ends in *Madneſs*, the reaſon is almoſt the ſame with the former, but inverted; to wit, becauſe in a *Phrenſie* the Spirits and the nervous Liquor becoming *Sulphureous*, and too much inflamed, afterwards burning forth, get to themſelves *Saline* Particles, and ſo in like matter get a moſt ſharp and as it were a *Stygian* nature; wherefore the *Feavour* then ceaſing, the *Fury* becomes fixed and continual.

1. By what means it comes upon Melancholy.

2. How upon a Phrenſie.

2. The Original of Madneſs ſometimes from the Blood.

2. The diſpoſition of *Madneſs*, hath no leſs frequently its roots in the bloody Maſs, and is at length produced into act, to wit, when as the Blood being depraved, and becomes *Nitro-ſulphureous*, it either perverts the nervous Liquor, as alſo the Animal Spirits, or ſupplies them but evilly. Which kind of taint of the Blood is either hereditary or acquired.

1. It is either Hereditary,

Firſt, It is a common obſervation, that men born of Parents that uſe ſometimes to be mad, are obnoxious to the ſame diſeaſe, and though they have lived above thirty or forty years prudent and ſober; yet afterwards without any occaſion or evident cauſe, they have fallen into Madneſs. The reaſon of which is, for that the Blood at that time bending from its due temper, by degrees into a *Nitro ſulphureous*, affords to the Head Animal Spirits, and alſo the nervous juice, participating (as hath been ſaid) of a moſt ſharp nature. We have formerly ſhewn, that in our Complexion, Elementary Particles do perſiſt during life, apart from the ſecondary, afforded by nutrition, and have their times of crudity, maturity, and defection; wherefore we ſuppoſe, the morbid ſeeds do ripen into fruit, according to the periods of Ages. Further, we take notice, that oftentimes the fruits of Diſeaſes of this kind, do remain ripening for a long time, or perpetually as long as life; yet ſometimes falling off as it were of their own accord, do wither away; then ſometimes in another tract of time, from the infection being left, new fruits do ſpring up, and by little and little riſe up to their height. Wherefore, *Hereditary Madneſs* is ſometimes continual, and ſometimes intermitting; Its fits are wont ſometimes to come again after a ſhorter time, and ſometimes after a longer interval.

The Reaſon of which is ſhewn.

2. Or acquired, and ſo either,

Secondly, As the foregoing Cauſe of *Madneſs* ſticking in the Blood, is oftentimes innate or original, ſo ſometimes the ſame is by degrees begotten, either by an evil manner of diet, or by the ſuppreſſion of uſual evacuations, or by reaſon of a Feavour going before, or for ſome other cauſes, and at length being brought to maturity, breaks forth into *Madneſs*. It is an uſual thing in great want of ſuſtenance, that ſome poor people, being conſtrained to feed only on very diſagreeing meats, and of ill digeſtion, become at firſt ſad, with an horrid aſpect, louring and dark, and a little after Mad. The *Hæmorrhoids*, and the after flowings of Women in Child-bed, being reſtrained in their flux, or ſome evil and foul running Ulcers being ſuppreſſed, diſpoſe ſome towards this Diſeaſe. Further, thoſe who originally, or by acquiſition, are indued with a more ſharp temper, and with fierce manners, and threatning countenance, by reaſon of the diſpoſition of their Blood, being nigh to a *Nitro-ſulphur*, are in danger to fall into Madneſs, from ſome ſtrong evident cauſe.

By reaſon of errours in the ſix Non-naturals;

Or by reaſon of Poyſons.

Thirdly, Venomous Ferments being inſinuated to the Blood and nervous juice, as firſt of all from the biting of mad Animals, or by the taking of ſome poiſons, are wont to ſtir up Madneſs. Concerning the reaſons of the former, we have propoſed our conjectures in another place. Of late a very Noble Lady, and to be credited, told me from her own knowledge, that a certain Gentleman, having eaten at dinner time the tender leaves of Wolfs-bane, in a Sallad with other herbs, in the Evening found himſelf ill, and complaining of a great unquietneſs and agitation of his Blood and Spirits, he deſired his Friends to ſend for a Chirurgeon to let him blood, or that otherwiſe he ſhould grow Mad; which indeed, as he ſaid, came to paſs; for before he could be let blood, he fell into Madneſs, and dyed in a nights ſpace: This kind of deadly Diſtemper ſo ſuddenly happened, for that this poiſon had not only perverted the Blood and Animal Spirits, as to their temper, but had ſlain or beat them down immediately, with its malignant Ferment.

An Hiſtory of a Mortal Madneſs, from eating the leaves of Wolfs Bane.

Thus

Thus much for the formal Reaſon, and Cauſes of *Madneſs*. The *primary Symptoms* of it, we have mentioned to be a *Delirium* and a *Fury*; the reaſons of which appear clear enough from what has been already ſaid. To theſe we may moreover add Boldneſs, Strength, and that they are ſtill unwearied with any labours, and ſuffer pains unhurt, of which we will ſpeak briefly. *The Reaſons of the ſymptoms of Madneſs explained.*

Mad-men are not as *Melancholicks*, ſad and fearful, but audacious and very confident, ſo that they ſhun almoſt no dangers, and attempt all the moſt difficult things that are. The reaſon of which is, becauſe the Animal Spirits being very fierce and provoked, both fortifie the Imagination, that no object may ſeem greater or bigger than it is wont to be, and actuate alſo the *Præcordia* with vigor, ſo that they caſt forth the Blood ſtrongly and ſwiftly, and drive it forwards lively to the utmoſt borders of the Body. In this Diſtemper the Soul endeavours to be carried forth, and to leap beyond the compaſs or ſphere of the Body, and ſo ſtriving on every ſide, againſt the incurſions of any exterior things, bears it ſelf without fear. 1. *Wherefore Mad-men are audacious.*

Secondly, *Mad-men* are ſtill ſtrong and robuſt to a prodigy, ſo that they can break cords and chains, break down doors or walls, one eaſily overthrows many endeavouring to hold him. The certain cauſe of which is, becauſe in the Blood and nervous juice of Mad people, are contained Particles as it were *Nitro ſulphureous*, or otherways moſt ſharp, and as it were *Stygian*; from whence the Animal Spirits are indued, or are ſtrong with an *Elaſtick* or *Exploſive* force, ſtupendous, great, and far beyond what's natural. 2. *From whence their immenſe ſtrength.*

Thirdly it is obſerved, that *Mad men* are almoſt never tired; for although by playing mad pranks, and ſtriving many days and nights they ſtrongly exerciſe their members, and live in the mean time without ſleep or eating, yet they ſcarce languiſh at all, nor deſiſt from their agonies for want of ſtrength. Which without doubt comes to paſs, for that the Animal Spirits, though very moveable and *Elaſtick*, are not however volatile and eaſily diſſipable, but by reaſon of the *Saline* Particles being depreſſed from their volatileneſs into a flux, being joined with the *Sulphureous*, become firm and more fixed; and therefore continue longer in their activity. In like manner as we have obſerved in *Aqua fortis*, which though it be contained in a veſſel that's open, perpetually ſends forth very many Effluvia's, and yet ſtill retains its ſubſtance unwaſted, and its corroſive force, otherwiſe than the ſpirit of Wine or Blood, the virtue of which ſoon evaporates. 3. *Wherefore they are never tired.*

In the fourth place, almoſt for the ſame reaſon, *Mad-men*, what ever they bear or ſuffer are not hurt; but they bear cold, heat, watching, faſting, ſtrokes, and wounds, without any ſenſible hurt; to wit, becauſe the ſpirits being ſtrong and fixed, are neither daunted nor fly away. Further, the blood having gotten a *Nitro ſulphureous Dyſcraſie*, is incapable of any other ſudden mutation; wherefore, although inſenſible tranſpiration be hindred, and other uſual evacuations ſuppreſſed, or the ſupplies of the nouriſhing juice degenerated, yet neither a *Catarrh*, nor *Feavour*, nor *Atrophy*, or *evil digeſtion* eaſily comes upon *Madneſs*. For in this Diſtemper, although the Particles of the Blood do greatly ſwell up, yet by reaſon of the abundance of Salt they do not conceive a Feavouriſh burning. Even as alſo *Aqua fortis*, though it grows very hot and burns other ſubjects, yet it ſelf is not at all inflamed, but rather reſiſts burning. 4. *Wherefore they are not eaſily hurt.*

The differences of this Diſeaſe are eaſily gathered from what hath been before ſaid; for firſt as to its beginning, it is either *occaſional*, which ſometimes quickly ceaſes, the evident cauſe being taken away preſently; or *habitual*, depending upon a foregoing cauſe lying in the Blood, and that either *hereditary*, or *acquired*. *The Differences,* 1. *In reſpect of the Original.*

Secondly, by reaſon of the *magnitude*, *Madneſs* is either highly furious, that the diſtemper'd ought to be bound or lock'd up, leſt they ſhould attempt any miſchief to themſelves or others; or elſe it is more gentle, in which the ſick, being converſant with others, abſtain from any malice or hurt. Thirdly, In reſpect of time, *Madneſs* is wont to be long or ſhort, continual or intermitting. Fourthly, As to the various kinds of *Deliriums*, the ſhapes or *types* of this Diſeaſe are almoſt innumerable; all which to run thorow, is neither poſſible, nor worth the while; but moſt commonly, the diſtemper'd are mad alike in all things, or elſe chiefly as to one particular thing, having their judgment concerning other matters for the moſt part right. 2. *By reaſon of the Magnitude.* 3. *In reſpect of Time.*

As to the *Prognoſtick* of *Madneſs*, if the diſtemper'd be not obnoxious to a *Feavour*, nor any other Diſeaſes beſides, nor eaſily hurt by external accidents the Diſeaſe is not mortal of it ſelf; yet the Cure is very difficult, becauſe there is made a great alteration in the Blood and Spirits, and the ſick reſiſt every method of healing, and are enemies to *Phyſicians* and to themſelves. *The Prognoſtick.*

If *Madneſs* be inveterate or hereditary, or is cauſed by the biting of a Mad-Dog, it

is

is hardly or not at all to be cured. What is excited upon ſome occaſion, or from a ſolitary evident cauſe, or ſucceeds a Feavour, alſo upon which comes a Mangineſs, Whelks, the *Hæmorrhoids*, or ſpots in the skin, is eaſily cured.

Thoſe who are obnoxious to this Diſeaſe at intervals, about *Midſummer*, or when the Dog Star ariſes, are in greateſt danger; alſo thoſe who are altered according to the changes of the Air, or when long cold and foul weather are oppoſite in the conſtitution of the Heaven.

The Cure. As there are two kinds of *Madneſs*, to wit, Continual, and Intermitting; ſo the means of healing ought to be twofold.

What the indications are of continual Madneſs. 1. The *Curatory* method to be adminiſter'd, as to continual *Madneſs*, ſuggeſts the commonly noted three primary Indications, *viz.* The firſt *Curatory*, which reſpecting the Diſeaſe it ſelf, endeavours to correct or allay the furies and exorbitances of the Animal Spirits. Secondly, *Preſervatory*, which being levelled againſt the cauſes of the Diſeaſe, endeavours to take away or amend the ſharp and *Nitro-ſulphureous Dyſcraſies* of the nervous Juice and the Blood, as alſo the *Stygian* diſpoſition of the Spirits. Thirdly, *Vital*, which directs ſuch a means of dyet and reſtraint, which is only fit in this Diſeaſe, for the nutritive and vital function to have and be ſuſtained with.

1. *The Curatory Indication.* The firſt Indication, *viz. Curatory*, requires threatnings, bonds, or ſtrokes, as well as *Phyſick*. For the *Mad-man* being placed in a Houſe convenient for the buſineſs,

As to Diſcipline. muſt be ſo hand'ed both by the *Phyſician*, and alſo by the Servants that are prudent, that he may be in ſome manner kept in, either by warnings, chiding, or puniſhments inflicted on him, to his duty, or his behaviour, or manners. And indeed for the curing of Mad people, there is nothing more effectual or neceſſary than their reverence or ſtanding in awe of ſuch as they think their Tormentors. For by this means, the Corporeal Soul being in ſome meaſure depreſſed and reſtrained, is compell'd to remit its pride and fierceneſs; and ſo afterwards by degrees grows more mild, and returns in order: Wherefore, Furious Mad-men are ſooner, and more certainly cured by puniſhments, and hard uſage, in a ſtrait room, than by *Phyſick* or Medicines.

As to Medicine. But yet a courſe of *Phyſick* ought to be inſtituted beſides, which may ſuppreſs or caſt down the Elation of the Corporeal Soul. Wherefore in this Diſeaſe, Blood-letting, Vomits, or very ſtrong Purges, and boldly and raſhly given, are moſt often convenient; which indeed appears manifeſt, becauſe *Empericks* only with this kind of *Phyſick*, together with a more ſevere government and diſcipline do not ſeldom moſt happily cure Mad folks. But indeed, this more ſharp handling is not convenient for all Mad people, but to the moſt furious. Others more remiſsly Mad, are healed often with Flatteries, and with more gentle Phyſick.

Phlebotomy. In moſt Mad folks the taking away of Blood copiouſly ought to be in the beginning of the Diſeaſe, as it is the common practice and vogue of the people. And indeed, while there is ſtrength, the opening a vein ought to be repeated, ſometimes in the Arm, ſometimes in the Neck Vein, Forehead, or Foot; and ſometimes it is expedient for the *Hemorrhoidal* Veſſels to be opened by Leeches; for theſe evacuations being timely made, both the raging of the Spirits and the lifting up of the Soul, are beſt of all ſuppreſſed; then beſides the *Dyſcraſies* or evil habits of the Blood (for that what was ſharp and Corroſive in it being drawn forth, a new and gentler comes in its place) are amended.

Vomiting Medicines. That Vomiting Medicines are highly profitable for the curing of Mad people, it is almoſt a Proverb, ſo that the moſt part of *Hellebore*, yea almoſt all *Anticyra* is allotted to them. By what means *Emeticks* do often help in *Cephalick* Diſeaſes, we have ſhown already. *Quack-ſalvers* in this caſe, give with ſucceſs many times, though raſhly and with danger, a large Doſe of *Stibium*: But *Chymical* things are here more convenient, both becauſe they move more ſtrongly, and becauſe alſo the ſick may be more eaſily deceived by them.

Take *of the Sulphur of Antimony eight grains to ten, of the Cream of Tartar half a ſcruples; mix them together by pounding them; make a Powder; let it be given in a ſpoonful of grewel*; or if it be to be given deceitfully, to one not knowing of it, let it be put into a bit of white Bread, and ſo let it be taken in Milk or Broth. Let this Vomiting Medicine be often repeated, to wit, once in four days.

Take *ſix or ſeven grains of Mercurius Vitæ; let a Powder be made, and given after the ſame manner.* The *Emetick Tartar* of *Mynſicht*, and of *Hercules Bovius*, and other various preparations of *Mercury* may be given after the ſame manner. *Aurum vitæ* or the *Solar* Precipitate, alſo the *Lunar* Precipitate, are eſteemed by *Chymiſts* for ſpecifick Remedies againſt madneſs; and indeed, *Mercurial* Medicines, for that they operate not only by Vomit and Stool, but oftentimes by Sweat, Urine, or Salivation, do notably help. A long and plentiful ſpitting or flux at the mouth hath perfectly cured ſome Mad people.

3. The

3. The more ſtrong Purging Medicines, (where ſtrength and the conſtitution may bear them) becauſe they depreſs the raging of the Spirits, and of the Blood, and very much evacuate the *Emunctories*, that are for the receiving the recrements of the Blood, and nervous Juice, do often bring help in this Diſeaſe. For this uſe preparations of black *Hellebore*, as chiefly its extract, and Wine of the Infuſion of its ſtrings, or the pulp of an Apple with the roots of it boiled together are much praiſed. *Purging Medicines.*

Take *of the Extract of black Hellebore, of Calamelanos of each one ſcruple: make a Bolus.*

Take *Calamelanos one ſcruple, of Diagridium from twelve to fifteen grains; make a Powder.*

Take *of Confectio Hamech, or of the Electuary of the juice of Roſes half an ounce to ſix drams: let it be given in broth.*

Take *of the Decoction of Senna Gereonis, or of Epithimum (with the roots of black Hellebore two drams) ſix ounces; make a draught.*

Take *of the Powder of Diaſenna two drams: let it be taken in Poſſet-drink.*

In the mean time, whilſt theſe things are doing, let the Preſervatory Indication reſpect the cauſe of this Diſeaſe. Wherefore, with theſe frequent purgings and letting of Blood, between whiles let altering Medicines or Remedies be uſed, which may attemper the Blood and nervous juice, and reduce them to their due temper; if that the ſick be tractable and orderly enough, they will not refuſe to take ſuch things methodically. *The preſervatory Indication. Altering Medicines.*

Take *of Cryſtal Mineral, or of the beſt purified Nitre two ounces, of Pearls powdered two drams, of Sugar Candy two drams and a half, of Camphor half a ſcruple; let them be all beaten together to a moiſt fine Powder: let two drams of this be put into a glaſs veſſel that will hold two quarts of Spring-water, or of clear ſmall Ale, or Beer and mild; let it be given for ordinary drink at pleaſure.*

Put to *Whey* being made hot the flowers of *Violets* or *Water-Lilies*, and after they have infuſed for two hours, let them drink it plentifully; alſo the *Spaw* Waters are convenient for Mad people to drink orderly, and plentifully. *Whey.*

Take *of the tops of green and the tendereſt Borrage, and Bugloſs, each four handfuls; three Apples pared, of Sal Prunella two drams, of Sugar half an ounce; let them be bruiſed together, and pour to them of Spring-water three pints; make a ſtrong Expreſſion: take half a pint thrice in a day or oftner.* *An Expreſſion.*

Take *of the Conſerves of Borrage flowers, and of Violets, each three drams; Confectio de Hyacintho, of Alchermis, each two drams; of Coral prepared a dram and an half, of the Powder of Pearls one dram, of the Salt of Coral one dram, of the Syrup of red Poppies what will ſuffice; make an Electuary, of which take two drams twice or thrice in a day, drinking after it of the following liquor four ounces.* *An Electuary.*

Take *of the waters of the flowers of the Water-Lilie, Borrage, Bugloſs, and of black Cherries, each four ounces; of red Poppies ſix ounces, of red Roſe-water two ounces, of Camphor tyed in a rag and hang'd in the glaſs half a dram, of the Syrup of Coral one ounce and a half; mix them and make a Julep.* *A Julep.*

Take *of the yellow flowers of the Willow-tree what will ſuffice, let them be diſtilled in a common Still, and let the Diſtillation be repeated, by putting to it freſh flowers for three times: Give of it four ounces twice or thrice in a day, ſweetning it with the Syrup of Water-Lilies.* *Diſtilled Waters.*

Take *of the leaves of the Willow, Meadowſweet, Pimpernel, Borrage, Balm, each ſix handfuls; of the flowers of the Water-Lilie, of the tops of St. Johns-wort, each four handfuls; of Camphor powdered three drams, all being bruiſed together, pour to them eight pints of new Milk; let them be diſtilled in common Stills.*

Let the brains of Weathers be diſtilled with Milk, and give of the water three or four ounces thrice in a day.

Further there are to be uſed Specifick Remedies, ſo called, of which is famous, a Decoction of *Pimpernel* with the purple flower, alſo the tops of *Hypericon* or St. *Johns-wort*, and other Decoctions, Opiates, and Powders of *Antilyſſi* are frequenly noted among all the famous *Empericks*. *Specificks.*

Concerning the cure of *Madneſs*, excited from the biting of venomous or mad Animals, for that it is almoſt only *Emperical*, and commonly known, we ſhall not diſcourſe of it in this place, and ſince we have elſewhere propoſed our conjectures concerning it. But a Decoction or an Infuſion of Apples, either raw or boil'd in Spring-water, the liquor *A Decoction and Infuſion of Apples.*

quor of *Tea*, Emulſions, with many other things, whoſe forms we have ſhewn in the Cure of *Melancholy*, are convenient in this caſe.

Other Chirurgical Remedies. Moreover, from *Chirurgical* Remedies, beſides opening of a Vein, many other helps are wont to be had for the curing of this Diſeaſe. *Cupping-glaſſes* with Scarification, often help. *Bliſterings*, *Cauteries* both actual and potential are praiſed of many. Others commend cutting an *Artery*, others *Trepaning*, or opening the Skull, others *Salivation*. But theſe kind of adminiſtrations, beſides that their effects are uncertain, can hardly be performed, or not at all ſafely, by reaſon of the intractability of the ſick; wherefore, it were here ſuperfluous to inquire into the reaſons of help or cure to be expected from them. The hair being ſhaven off, ſometimes it is expedient to apply to the forepart of the Head the hot Lungs of a Lamb or Weather, and other Fomentations, and ſo to change them. But theſe ſorts of Remedies alſo are hardly to be applied and repeated methodically, becauſe of the reluctancy of the ſick, and ſo often afford more hurt than help.

3. The vital Indication. 3. The vital *Indication* inſtitutes how mad people ought to be handled, concerning their government, dyet, and ſleep. In this Diſeaſe there is no need of keeping up the fleſh, as in moſt other Diſeaſes: For the ſpirits ought not to be refreſhed with Cordials, nor ſtrength to be reſtored with Medicines; but on the contrary, both being too raging of themſelves, things are to be adminiſter'd as it were for the ſuppreſſion or extinction of a flame raging above meaſure. Therefore let the diet be ſlender and not delicate, their cloathing courſe, their beds hard, and their handling ſevere and rigid. But ſleep, for that it is very neceſſary, ought to be cauſed ſometimes by *Anodynes*; for which end, *Hypnotick* Remedies or Medicines above preſcribed for *Melancholy*, are alſo convenient in this Diſeaſe. In inveterate and habitual Madneſs, the ſick ſeldom ſubmit to any *Medical* Cure; but ſuch being placed in *Bedlam*, or an *Hoſpital* for Mad people, by the ordinary diſcipline of the place, either at length return to themſelves, or elſe they are there kept from doing hurt, either to themſelves or to others.

Hiſtories and Examples of mad people are to be ſought in Bedlam, *or Hoſpitals for mad people.* There is no need to illuſtrate the nature of this Diſeaſe with Hiſtories and Examples, or to deſcribe the manifold Types of it; but rather let them go to the *Hoſpitals* of Mad people, where they may behold, not without a wonderful ſpectacle, as it were a new and monſtrous nation of men, contrary to rational people, and as it were our *Antipodes*; all which, if they were gathered together in one place, and that all, Madmen and Fools were joyned to them; I know not whether this world would not be equally divided between them and the ſober and prudent.

The Cure of Intermitting Madneſs. Thus much concerning the cure of continual *Madneſs*. The intermitting, either has perfect lucid intervals, in which the ſick return to themſelves, or the fury only ceaſes, the *Delirium* being ſtill left, inſomuch that the diſtemper'd become gentle and tractable, yet ſtill they continue amiſs, as to their imaginatiou and judgment, and ſpeak and do many abſurd or incongruous things, and afterwards ſometimes again become furious.

The Curatory Indication. The Cure of either of theſe Diſtempers, as to the Curatory Indication, is the ſame, as in continual *Madneſs*, ſo that there is no need to ſhew here any other Medicines, or method. But as to what reſpects the *Prophylaxis* or Preſervatory Indication, by which the means of healing is inſtituted out of the fits, cautions and threatnings are to be given them; in whom only the Fury intermits, the *Delirium* remaining, the very ſame Remedies of Medicine, which we have preſcribed for the taking away the foregoing cauſe of *Melancholy* are convenient.

Preſervatory. In *Madneſs* which perfectly intermits, as to all its *Symptoms*, at the chiefeſt convenient times, to wit, Spring and Fall, they ought to enter into a ſolemn courſe of *Phyſick*; and beſides, there is a continual need of looking to, or governing the ſick, both as to diet and to their manner of living, that they may be always preſerved in an equal and a moderate temper; and alſo, that as ſoon as the ſigns of the approaching fit appear, its coming may be hindred by Blood-letting, and by adminiſtring of Medicines.

Therefore, in the times of the *Æquinoxes*, let Blood be taken out of the Arm, and ſeven or eight days after out of the *Hemorrhoidal* Veins by Leeches. Let Purges and Vomits be given twice or thrice at due intervals. Moreover, between whiles, let them take in order altering Remedies, at *Phyſical* hours. The *Formulas* or *Recipes* of theſe are ſet down both in this Chapter and in the former for the cure of *Melancholy*. Let the dyet be ſlender and of good digeſtion; as concerning exerciſe or motion, ſleep, and other *non-naturals*, let them be all moderate. When the approach of *Madneſs* is ſeen to be at hand, and conſtantly before the Summer *Solſtice*, let *Phlebotomy* be celebrated, with Vomiting, and a more ſlender or ſparing diet.

CHAP.

CHAP. XIII.

Of Stupidity, or Fooliſhneſs.

Stupidity, or *Moroſis*, or Fooliſhneſs, although it moſt chiefly belongs to the Rational Soul, and ſignifies a defect of the Intellect and Judgment, yet it is not improperly reckoned among the Diſeaſes of the Head or Brain; foraſmuch as this *Eclipſe* of the ſuperior ſoul, proceeds from the Imagination and the Memory being hurt, and the failing of theſe depends upon the faults of the Animal Spirits, and the Brain it ſelf.

Stupidity ariſes chiefly from the failing of the Imagination and Memory.

We have before clearly ſhewed, that the Rational Soul doth ſubſiſt in a ſenſitive or corporeal Soul, and that its principal ſeat is the Imagination: Further from *this*, and the *Memory*, either the notions themſelves, or their occaſions of all things are ſupplied, which the Mind beholds; wherefore, when it happens that theſe Corporeal Functions are defective or hindred, forthwith the eye of the Intellect, as if covered with a vail, is wont to be very much dulled, or wholly darkned. Therefore, that the reaſon of *Fooliſhneſs* and *Stupidity* may be rightly delivered, firſt we ought to inquire by what means, and from what cauſes, the *Imagination* and the *Memory* are often defective or fore-hindred.

Wherefore the Organs of theſe Faculties labour in this Diſeaſe.

That we may proceed methodically, concerning theſe, hither ought to be referred, what we have diſcourſed before concerning the Functions of the Corporeal Soul, and their ſubjects and inſtruments. we have at large declared that the *Callous* Bodies, or the middle of the Brain is the ſeat of the *Imagination*; and the Cortical Marrows of the Brain, the ſeat of the *Memory*; and further, that the Animal Spirits are the immediate organs of either. Wherefore, becauſe their powers being hindred (which are the firſt or chief movers of any other Function, both rational and ſenſitive) the Imbecillity and dulneſs of the mind, the ſlowneſs of the ingenuity, ſtupidity and madneſs at length do often ariſe; the fault is either in the Brain it ſelf, or the Animal Spirits, or both together, and at firſt now theſe, now that.

1. As to the Animal Spirits, we have largely enough declared, of what ſort they ought to be, of their proper and genuine nature, and what they are by reaſon of their preternatural diſpoſition, in the *Phrenſie*, *Melancholy*, and *Madneſs*. But beſides (which we before mentioned) it may be ſuſpected, that theſe Spirits being ſometimes almoſt deſtitute of active Particles, become as it were liveleſs or vapid; to wit, when the ſpirituous Particles ought to excel, and to get to themſelves volatile Salts; in *Stupidity*, both theſe, together with the Sulphureous, being too much depreſſed, they are almoſt drowned and overwhelmed with the watery and terreſtrial. For indeed, Fools are not ſo dull or of ſuch thick underſtanding, as their ſoul ſeems to be indued with, and their Animal Spirits are rather formed of clay than their Heart. There are many occaſions or evident cauſes, by which the Animal Spirits acquire ſo deadiſh a texture, the chief of which we ſhall touch on by and by.

2. But it doth not frequently come to paſs, that *Stupidity* is excited by the mere ſolitary fault of the Spirits, or of the Corporeal Soul it ſelf, but more or rather the Brain it ſelf is found to be firſt in fault: For as there are many things requiſite, by which this exact ſubject or machine of the Animal Function is conſtituted, if by chance any thing of them be deficient or depraved, it eaſily follows, that ſuch ſo diſtemper'd have little wit.

1. *As to Magnitude.*

Firſt, It is a vulgar obſervation, That the wit and ingenuity doth depend ſomewhat on the magnitude and figure of the Head, and conſequently of its Brain; for as to its bulk, it is a Proverb, that it argues little of Brain or too much Fooliſhneſs. And although this does not always happen, yet it does for the moſt part. The reaſon of which is, becauſe in a little Brain but a few Spirits are begotten and exerciſed; but in a greater, conſiſting for the moſt part of a vile or baſe texture or frame, it is leſs fitted for the quickneſs or ſharpneſs of the mind.

2. *By Reaſon of the Figure.*

Secondly, The genuine and beſt figure of the Brain ought to be globous; to wit, for the end that the Spirits may be poured forth with an equal efflux on every ſide, from its middle part to the whole compaſs, and may be from thence retorted every where by equal angles of reflections. But thoſe who have a flat head, or too ſharp, or otherways improportionate, are affected for the moſt part with ſome noted fault of the Animal Function; for theſe kind of Brains, like diſtorted Looking-Glaſſes, do not

rightly collect the Images of things, nor truly object them to the Rational Soul.

3. As to its Subſtance or Texture.

Thirdly, The ſubſtance of the Brain ſhould be well temper'd, and of a laudable frame; not only as to the qualities of heat and cold, of drineſs and moiſture, but its *Syſtaſis* or Conſtitution conſiſting of plenty of a volatile Salt and Spirit, with a moderate proportion of the reſt ſhould be thin and airy, that the Spirits may paſs thorow the whole, and cut out to themſelves paths; alſo it ſhould be moderately firm and compacted, that the tracts and paſſages being made, may remain, and not be preſently blotted out again, by the ſinking of the too ſoft parts. But in *Stupidity*, it is to be ſuſpected, that there is in the Brain an exceſs of ſome manifeſt quality, as of moiſture or coldneſs, for which reaſon, Children and old people are wont to be affected with a dulneſs of their ſenſes; or ſometimes, the Texture is too thick, and Earthy; ſo that the ſpirits do not eaſily irradiate it, or cut tracts for themſelves; to wit, they cannot penetrate an opacous or thick body, no more than rays of light. To this kind of deadiſh Texture of the Brain, thoſe that are born of Plowmen and Ruſticks, as if they were formed of a worſer clay, are obnoxious; hence in ſome Families, reckoning many deſcents backward, there is ſcarce one witty or wiſe man found. In ſome places, the influences of the Heaven and Air incline, as it is thought, the Inhabitants to Stupidity; ſo, to be born in *Batavia*, is proverbially, as much as to ſay, a Fool.

4. The evil conformation of the Brain, as to its pores and paſſages.

Fourthly, Beſides theſe vices of the Brain, which are for the moſt part original and born with it, ſometimes its evil conformation, as to its Pores and Paſſages, by reaſon of ſome acquired inordinations, is a cauſe that the Animal Function is not rightly performed. For firſt of all, as to what appertains to the ſmaller Paſſages and Pores of the Brain (which the ſpirits themſelves frame every where thorow its whole ſubſtance, and perpetual flow into them for the exerciſe of the Animal Functions) it ſometimes happens that theſe are either defective or perverted, and ſo bring on a dulneſs of mind, or *Fooliſhneſs*. Theſe little ſpaces are defective, becauſe the conſiſtency of the Brain being either too obdurate or too fluid, it will not indure to be cut thorow after a due manner, or to remain or continue ſo bored thorow. But we ſuſpect thoſe Paſſages to be perverted, either becauſe they are too looſe or too ſtrait, or elſe, for that their making is unequal. Too ſtrait Pores do not ſufficiently admit ſtore of matter for a good plenty of Spirits: Thoſe looſe above meaſure, receive together with that matter, *Hetęrogeneous* Particles, and infeſting the Animal Regiment. They ſeem to be unequally formed, where they are more open in one part of the Brain, and more ſtrait in another. For this cauſe we think it to be, that ſome underſtand, or know things well enough, but ſtill judge evilly; for that their notions and conceptions, like the viſible Images, paſſing thorow a diverſe Medium, become diſtorted. Further, perhaps for this reaſon it comes to paſs, that ſome excel, or are ſtrong in Imagination and Phantaſie, yet are very deficient in Memory, and others on the contrary.

3. Stupidity ſometimes proceeds from both of them being in fault together.

3. It ſometimes happens, that both theſe conjunct cauſes do concur together to Fooliſhneſs, to wit, becauſe both the Animal Spirits are dull and torpid, and alſo the Brain evilly conformed. And in truth, which part ſoever is firſt in fault, it quickly will make the other in like manner guilty. Becauſe when the Spirits being blunt and ſluggiſh do not freely paſs thorow the Brain, the Pores and Paſſages in it are not either ſufficiently cut thorow, or elſe they cloſe again; and the Spirits if they cannot expand themſelves, by reaſon of the evil texture of the Brain as they ſhould do, they at length becoming ſlothful and idle, grow heavy, and acquire a vicious diſpoſition.

What the Antecedent Cauſes of Fooliſhneſs, are,

Thus much concerning the Conjunct Cauſes of *Fooliſhneſs*, as to its *Procatartick* and *Evident*, there belong more occaſions, by reaſon of which the aforeſaid evils are wont to be brought to the Brain, or the Spirits, or to both together.

1. An Hereditary Diſpoſition.

For in the firſt place, *Stupidity* (as we but now obſerved) is ſometimes original or born with one, and ſo it is either *hereditary*, as when Fools beget Fools, the reaſon of which is clear enough, to wit, the ſame weak Particles flowing for the conſtituting the Animal Organs in the Son, which were in the Father: or *Stupidity* being born with one, is as it were accidental, to wit, it frequently happens, that wiſe men and highly ingenious, do beget Fools and Changelings, or heavy witted: which we ſuppoſe ſo to come to paſs ſometimes for this cauſe, for that the Parents being too much given to ſtudy, reading, and meditation, the Animal Spirits that inhabit the Brain, are ſo much waſted, that for the ſupply of them, the moſt generous Particles of the Blood are ſtill carried to the Head, and but few only, and ſmall, are permitted to deſcend to the *Spermatick* Bodies. When the rational Soul becomes greatly ſolicitous in bringing forth its child (which are the works of the Intellect) then the Corporeal Soul (the Spirits being called away to wait on the other) becomes not at all, or very weakly prolifick.

Why ſtrong or wiſe men are not always begotten of ſtrong and wiſe Men.

The firſt Reaſon.

A Second Reaſon.

Beſides this reaſon, there is another frequently to be met with, wherefore the firſt implanted ſagacity of men, as well as of *Brutes*, is not often propagated from the Parents

Parents to the Children. For when as we preſume certainly, the Colt of a generous Horſe, or of a delicate ſtrain, or the Chickens of a Game-Cock, that they will *patriſſare*, or be like their Sires, ſo that they are ſold at a great rate, and the virtues of theſe, if not broken by inordinate and preternatural feeding or bringing up, deſcend by a long ſeries to their young from age to age: This often happens otherwiſe to men, to wit, becauſe the Parents do ſo enervate and weaken their bodies by intemperance, luxury, and evil manners, that they beget only languiſhing and unhealthy Children. Hence it is, that for the moſt part, thoſe who are born of Parents broken with old age, or of ſuch as are not yet ripe or too young, or of drunkards, ſoft, and effeminate men, want a great and liberal ingenuity or wit. Nor does there happen a leſs detriment to them of the Animal Faculty, whoſe ſires are obnoxious to evil affections of the Brain, as the *Palſie*, *Epilepſie*, *Carus*, *Convulſions*, and the like; ſo that to be born of Parents who *have a ſound mind in a ſound body*, is far beyond a large patrimony.

2. *Ripeneſs and the Declination of Age diſpoſe ſome to Fooliſhneſs.*

Secondly, There are more evident cauſes, by which *Stupidity* is wont to be induced, to ſome originally whole. Some at firſt crafty and ingenious, become by degrees dull, and at length fooliſh, by the mere declining of age, without any great errors in living; to wit, becauſe the nervous liquor, and the blood, (whoſe evil diſpoſitions the Animal Spirits partake of) like ſome Wines, and other fermented liquors, depart from their vigor after a perfect Fermentation; and by little and little degenerate into a dead and pallid ſubſtance. For it is obſerved, the wits of ſome people do receive a various increaſe and decreaſe, according to the periods of their Ages. I have known many in their childhood very ſagacious, and extreamly docil or apt to learn, that by their literature and diſcourſe have cauſed admiration, who afterwards becoming young men, were dull and heavy: and thoſe who at firſt were very beautiful, were afterwards not at all handſome, or beautiful in their aſpect. In like manner, it often happens on the contrary, that many at firſt indocil or unapt to learn, and wholly unfit for literature, and ſeeming of an ill favour'd countenance, when they have become young men, or have put off their childhood, have had both an excellent wit, and become beautiful. The reaſon of the former is, that ſome ripe wit, or ingenuity, like garden fruit, does not remain long in the ſame condition, but ſoon declining, quickly withers. For in every mixture or concretion rightly made, there is required, that a progreſſion from crudity to maturity be made gently and by little and little, that is, the active elements do not at firſt ariſe above the reſt, and ſhew themſelves above meaſure, but being involved with the others, riſe up and put forth themſelves by little and little; for otherwiſe, being too free in the beginning, and made looſe, they eaſily fly away, leaving their ſubject almoſt dead or taſte leſs. Wherefore, Boys who are ſeen to be dull in their firſt Age, may be hoped afterwards, when the temper of the Brain (the ſuperfluous moiſture being evaporated) is come to maturity, to become ingenious enough.

3. *Great hurts of the Head ſometimes cauſe Doting, or want of Ingenuity.*

Thirdly, Sometimes great ſtrokes or bruiſing of the Head, eſpecially ſuch as happen from a fall from ſome high place, do bring hurt or debility to the Animal faculties. I have known ſome very learned, and men of great wit and judgment, who outliving ſome of theſe falls by chance, afterwards were of a heavy and dull ingenuity. It is commonly ſaid of ſuch ſo diſtemper'd, that their Brain is turned; and indeed a vehement Convulſion or ſhaking of the Brain, greatly perverts, and not ſeldom preſſes together, or ſhuts up the accuſtomed tracts and paths of the Spirits, ſo that they perform the acts of the Memory and the Imagination for ever after, hardly, and amiſs; ſo as ſome by ſome great wound inflicted on the Head, have become ſottiſh, and afterwards mad.

4. *Frequent Drunkenneſs.*

Fourthly, Frequent Drunkenneſs and Surfeiting, eſpecially if they ſleep in their Cups, and lie as it were buried in Wine and Sleep, do very much decay the wits of ſome, and make infirm the uſe of their Reaſon; to wit, becauſe by them, *Heterogeneous* little Bodies, and infeſting very much the Animal Regiment, are introduced. Almoſt for the ſame reaſon, the frequent uſe of *Opiates* very much troubles the ſharpneſs of the mind.

5. *Vehement Affections.*

Fiftly, Violent and ſudden paſſions, as in the firſt place, an unexpected and very great affright, or terror or vehement ſadneſs, have cauſed Sottiſhneſs or Fooliſhneſs in ſome, ſo that they have been ſcarce able to expreſs the ſenſe of their mind in words, or to perform the familiar actions of life. Which certainly comes to paſs, foraſmuch as the ſpirits inhabiting the Brain upon ſuch an occaſion, are very much diſſipated and drawn aſunder one from another, and afterwards, are not able to repeat the the former footſteps of their motions; in like manner as Souldiers, being put to flight by a ſudden and violent attack of the enemy, recover not eaſily their orders and ſtations.

6. *The more grievous Diſeaſes of the Head, oftentimes excite Fooliſhneſs.*

Sixthly, It is obſerved, that ſome men have contracted alſo *Fooliſhneſs*, by reaſon of cruel Diſeaſes of the Head. This frequently happens in a great and long *Epilepſie*, for that this Diſtemper, poſſeſſing the middle part of the Brain, perverts, and ſo fills and

ſtuffs up with feculencies, all the Pores and paſſages, the Spirits being thereby frequently and vehemently thruſt forth, that the tracts of the Spirits being ſhut up; the acts of the internal Senſes and Motions are hindred. I knew a young maid, at firſt of an acute wit, and lively ingenuity, who after ſhe had long laboured with the Falling-ſickneſs, became ſottiſh and fooliſh, like a changeling. Further, I have taken notice in many, that *Stupidity* hath accompanied the *Palſie*, or has gone before it (as we mentioned in the Chapter of the *Palſie*) to wit, the ſame matter which brings a reſolution or looſning, being in the Streaked Body, being heaped up in the *Callous*, cauſes often, if not an *Appoplexy*, or *Carus*, a *Fooliſhneſs*.

The Differences of this Diſeaſe. Many differences of this Diſeaſe are to be met with; and firſt, there is commonly wont to be a diſtinction between *Stupidity* and *Fooliſhneſs*, for thoſe affected with this latter, apprehend ſimple things well enough, dextrouſly and ſwiftly, and retain them firm in their memory, but by reaſon of a defect of judgment, they compoſe or divide their notions evilly, and very badly inferr one thing from another; moreover, by their folly, and acting ſiniſtrouſly and ridiculouſly, they move laughter in the by-ſtanders.

How fooliſhneſs and ſtupidity differ. On the contrary, thoſe who are *Stupid*, by reaſon of the defect of the Imagination and Memory, as well as of the Judgment, do neither apprehend well, or quickly, nor argue well; beſides they behave themſelves not as the others by toying and geſticulation, but ſottiſhly, fooliſhly, or like a dull Aſs; ſo that the *ſimplicity* of theſe is the more miſerable, who ſhew ſo the Diſeaſe in their countenance and behaviour. In *Fooliſhneſs*, it ſeems, that the Animal Spirits being ſomewhat active, though leſs firm, do paſs thorow only more ſhort and oblique tracts, and do not beam thorow the Brain, with an equal and conſtant irradiation, but leaping forth, or running out deſultorily or after a leaping manner, ſometimes here ſometimes there perform the acts of the Animal Functions, perfunctorily only, or ridiculouſly. But in *Stupidity*, the Spirits being obtuſe and dull of their own proper nature, and flowing, very little pervious in the more thick Brain, cannot exerciſe themſelves rightly, for the performing the offices of the Animal Regiment.

Degrees of ſtupidity. Stupidity (whoſe *Pathology* we here chiefly deliver) hath many degrees; for ſome are accounted unfit or incapable, as to all things, and others as to ſome things only. Some being wholly fools in the learning of letters, or the liberal Sciences, are yet able enough for *Mechanical* Arts. Others of either of theſe incapable, yet eaſily comprehend *Agriculture*, or Husbandry and Country buſineſs. Others unfit almoſt for all affairs, are only able to learn what belongs to eating or the common means of living: Others merely *Dolts* or drivling Fools, ſcarce underſtand any thing at all, or do any thing knowingly.

The Prognoſtick of the Diſeaſe. As to what belongs to the *Prognoſtick*, *Stupidity* being contracted from the birth or hereditary, or happening from unknown cauſes, if it ſtill perſiſts to ripe age, it is almoſt never healed: but when it happens that Children being at firſt dull and almoſt inſenſible, by reaſon of the complexions of both their Brain and Spirits being ripened, they are made ingenious and docil enough.

Evil if from an hurt of the Head. This Diſeaſe excited from an evident ſolitary cauſe, as from an hurt of the Head, or a violent paſſion, alſo coming upon an inveterate *Epilepſie*, if it continues for ſome time, it is afterwards incurable.

What is excited from a Lethargy admits a Cure. What ſucceeds a *Lethargy*, and any other ſleepy Diſeaſes, depends chiefly on the hurt of the Memory, and ſometimes vaniſhes of its own accord, thoſe Diſtempers being cured. Therefore, when in theſe caſes the cure of *Stupidity* is inſtituted, here are convenient almoſt the ſame method of healing and Remedies, which we have preſcribed in the Preſervatory *Indication* of the *Lethargy*; the chief intentions of which are, that the Animal Spirits being freed from any torpor or benummedneſs, cut forth or frame Pores and paſſages within the tranſlucid Brain, and may be expanded truly in them.

Sometimes it is cured by a Feavour. Sometimes a *Feavour* has cured ſome Fools, and ſtupid, and render'd them more acute. *Huartus* tells of a certain man that was a Fool in the Court of *Corduba*, that being diſtemper'd with a malignant Feavour, came ſo much to himſelf in the midſt of the Diſeaſe, and with that judgment and diſcretion, that the whole Court ſtood in admiration; and ſo remained his whole life afterwards, one of the moſt prudent men of his time. We our ſelves have known a certain man of a very blunt, *Bœotick* or dull wit, who talking idly in a Feavour, moſt ſuddenly brought forth moſt acute ſpeeches, and ſeaſoned with a great deal of ſalt or ingenious wit. Further, we before ſpoke of a generous old Gentleman, who having loſt his memory, and ſo the uſe of diſcourſe, received great help by the diſtemper of a Feavour happening afterwards; the reaſon of which ſeems to be, becauſe the feavouriſh burning ſometimes rarefies and diſpels the darkneſs covering the Brain.

As

As to what reſpects the cure of this Diſeaſe, *Stupidity*, whether innate or acquired (if it be not plainly *Madneſs* or *Stolidity*, uncapable of all learning) though it may not be cured, yet is often wont to be amended. Wherefore it muſt be the work both of a *Phyſician* and a *Teacher*, that the wit of ſuch that are ſo affected, may be ſomewhat trimmed, and they being at leaſt brought to the uſe of reaſon in a little meaſure, may be accounted out of the number of *Brutes*. *The Cure requires both a Maſter and a Phyſician.*

For this end, becauſe dull or ſenſeleſs Beetles, or the more dull Loggerheads or Blockheads, do not readily learn the common notions of things, no more than Children the firſt elements of letters, therefore they are to be inſtituted in all things, by the frequent care of a Maſter, and the ſame things are again and again to be inculcated to them. For by this means, the Spirits, though ſlow and torpid, are a little ſharpened by perpetual exerciſe, and they being continually excited in the Brain, how rude and craſſe ſoever they be, do cut forth at length for their expanſion, ſome tracts or paſſages, though more imperfect. But that this may the more happily and eaſily ſucceed, medical Remedies ought to be adminiſtred, which may puriſie and volatize the Blood and nervous Liquor, together with the Animal Spirits; and alſo, that may clariſie the Brain, and render it as it were *Diaphanous*. *what the labour of the former ought to be.* *What the Medical intentions are.*

For the purifying the Blood, let there be ſometimes adminiſter'd a gentle Purge, and *Phlebotomy* in a ſmall quantity, if there be ſtrength, ſeveral times; for that end alſo Iſſues are convenient, in the Arm or Leg, or both, for the driving the filthineſs from the Brain: In fat folks, and ſuch as are indowed with a moiſt Head, let them ſometimes be made between the ſhoulders. Further, ſome in this caſe cry up with wonderful praiſes a *Trepaning*, by which the Brain may more freely breath forth, and evaporate. Let their diet be light and attenuating; their dwelling in a free air, and dry; their ſleep moderate. *What kind of Remedies are ſhewn.* *1. Evacuating Remedies.*

After theſe have for ſome time been adminiſtred, in the ordinary and uſual manner, *if that in the left part of the breaſt there is no beating of the heart in the Arcadian youth*, or if there be no ſign of hopes, it will be in vain to ſpend labour and pains, and Medicines any further on them: but if by the uſe of theſe, any ſigns of help, or any hopes appear, ſometimes it will be to the purpoſe to add to theſe, altering Remedies, to be daily taken at medical hours, for a long time. The *Recipes* or *Formula*'s of theſe are already delivered in our *Pharmaceutice* for the taking away the foregoing cauſes of moſt *Cephalick* Diſeaſes; and thence may be taken: moreover what do beſides reſpect this particular caſe, we think here good to add, being ſome magiſterial Receipts. *2. Altering Medicines.*

Take *of the Spirits of Armoniacum, ſuccinated, or with Amber ſix drams; let it be given from fifteen to twenty drops Evening and Morning, in three ſpoonfuls of the following diſtilled water; drinking after it ſeven ſpoonfuls of the ſame.* *Spirits.*

Take *of the freſh leaves of Miſletoe of the Apple tree ſix handfuls; of the leſſer Sage, Roſemary, Savory, the greater Rocket, Mother of Thyme, Calaminths, Penyroyal, Marjoram, each four handfuls; of the roots of Angelica, of Imperatoria, each ſix ounces; of Zedoary, the leſſer Galingal, of the Aromatick Reed, of Winterans Bark, each two ounces; of Cloves, Nutmegs, Mace, Cinnamon, Ginger, each one ounce; of Cubebs, Cardamums, Grains of Paradiſe, each ſix drams; all of theſe being cut and bruiſed ſmall together, pour to them twelve pints of the beſt Canary; let them be digeſted cold, and cloſe ſhut in a veſſel for three days, then diſtilled according to art: let the whole liquor be mixed together, and ſweetned with Sugar when it is taken: The Doſe is two or three ounces.* *A Diſtilled Water.*

After the uſe of the *Spirits of Armoniack* for fifteen or twenty days, other Medicines about that time may have their turns, ſuch as *Spirits* of *Harts-horn*, of Sut, *Humane Skull*; *Tinctures* of *Coral, Antimony, Caſtor, Amber*; the *Elixir Vitæ Quercitani, Elixir Proprietatis*, Spirits of *Lavender, &c.* *Tinctures, Elixirs.*

Or Take *of the Conſerves of the flowers of the Lilie of the valley ſix ounces, of the roots of Acori veri preſerved ſix drams, of Ginger preſerved in India, of preſerved Nutmeg, each half an ounce; of Species Diambræ two drams, of Lignum Aloes, yellow Saunders, the pickt roots of Zedoary, of Cubebs, of Jamaica Pepper, each one dram and a half; of Coral prepared two drams, of the Syrup of Candied Ginger what will ſuffice; make an Electuary. The Doſe two drams Morning and Evening, drinking after it of the diſtilled Water three ounces.* *An Electuary.*

For thoſe whoſe Brain is too abounding with moiſture, let them drink every Morning a draught of *Coffee*, with Sage leaves boiled in it: For thoſe who have their Animal Spirits too poor and liveleſs; let them take *Chocalate*, as we have deſcribed it above, which *Coffee.* *Chocalate.*

which ſeems moſt profitable. For ordinary drink let ſmall Ale or Beer be prepared in a veſſel containing three or four Gallons, and after it has work'd, put into it in a little bag, theſe following things. Take *of the leaves of Sage, the ſharp leaved and dryed, four handfuls; of Cubebs one ounce, of Cloves and of Nutmegs bruiſed*, &c. Mix them according to art.

Phyſical Beer.

Outward Applications.

Outward Applications have alſo a place here; ſuch are a quilted Cap, Plaſters, and Liniments: and ſometimes let theſe, ſometimes thoſe or others be adminiſter'd.

A Cap or quilted thing for the Head.

Take *of the flowers of the Lily of the valley, Roſemary flowers, Stœchadoes, each one handful; of Celtick Spike two drams, of the roots of Cypreſs, the leſſer Galingal, the Florentine Iris, each three drams; of Labdanum, Benzoin, of Toluvian Balſam, of Amber, each two drams; of Nutmegs, Cloves, Mace, Cinamon, each one dram and a half: make of them all a fine powder, quilting it in a Cap with ſilk between.*

A Plaſter.

Take *of the Plaſter of Floris unguent. ſo called, two ounces, of Tachamahac, of Carrana, of the Balſom of Tolu, each three drams; of the Powder of Amber, Myrrh, each two drams; of Cloves, Nutmeg, Mace, each one dram; being all liquefied or melted together, let them be made into a maſs, of which make a Plaſter, ſpread it on leather, and the head being ſhaved, put it to it.*

A Liniment.

Take *of the Oyl of Palms half an ounce, of Capive Balſom three drams, of the Balſom of Peru one dram, of the Oyl of Nutmeg, by expreſſion two drams, Oyl of Amber half a dram; make an Ointment for the Head.*

I might here add many other Medicines, and ways of Adminiſtrations, but in this almoſt deſperate caſe, where oftentimes no Remedies are wont to help, and the Cure never perfected, theſe may ſuffice.

CHAP. XIV.

Of the Gout.

The Diſtempers of the Gout and Colick are Diſtempers of the nervous Stock.

AMong the Diſeaſes of the Head and the nervous ſtock, we may refer hither ſome Diſtempers that are chiefly wont to infeſt the Feet and the Belly, to wit, the *Gout* and the *Colick*. That the ſeat of either is in the nervous parts, we may very well conclude from the primary *Symptom*, to wit, pain. The cauſe of this latter, *Charles Piſo* has affirmed to exiſt within the Head, and *Fernelius* affims the ſame of the other. Wherefore we ſhall endeavour to deliver the *Pathologie* of either, together with the appoſite means of healing them; and firſt we ſhall ſpeak of the *Gout*.

The Subject of the Gout.

The name of the *Gout* denotes plainly its ſubject; becauſe that it is almoſt only *Articulate*, or is in the ſpace where the heads of two or more Bones meet together. This Diſeaſe is wont to be excited more frequently about the *Internodia* or knittings of the Bones of the Feet; becauſe this part being greatly declining, and remote from the *Præcordia*, and the fountain of Heat, receives readily the Morbifick matter, and does not eaſily overcome it, or quickly put it off. Yet the *Gout* often happens in the jointings of the Hip or huckle-bone, the knee, the bending of the arm, the ſhoulder, the wriſt, the ancle, and of other parts.

Its appearances rehearſed.

The fits of this Diſeaſe (which are almoſt ever intermitting) invade either wandringly, or periodically; which being finiſhed, ſometimes ſooner, ſometime more ſlowly, the intervals happen lucid or quiet enough; preſently after the firſt aſſault of it, for the moſt part pains ariſe without any tumor; though afterwards, about the height of the Diſeaſe, the diſtemper'd part often ſwells up; the pains in the beginning yield to no Remedies, but are made more cruel by *Catharticks*, and are not preſently put to flight by *Topicks*, or wont to be allayed. The Fit moſt often falls upon one without any previous diſtemper, but ſuddenly; yet ſometimes there will be an heat of the blood, or a little feavourish diſtemper going before. The diſpoſition to this Diſeaſe is ſometimes hereditary, and ſometimes acquired, by reaſon of an evil manner of living. The occaſions or cauſes, which being wont to move this diſpoſition, ſtir up the *Gouty* pains, are all violent alterations or paſſions, inflicted on the humors or ſpirits. Hence Surfeiting immoderate drinking, eſpecially of ſharp and thin Wines, tranſpiration being hindred, wrath or indignation, immoderate Venus or Luſt, ſadneſs, alſo the changes of the air, and of the year, and any great mutations ordinarily induce fits of this Diſeaſe. Thoſe obnoxious

to

to this diſeaſe, are ſometimes in danger to be diſtemper'd alſo with the *Stone*, or Gravel in the Reins; and ſo on the contrary, thoſe obnoxious to the Stone, are wont to be troubled with the *Gout*. Yea the *Gout* growing grievous, it every where heaps up about its neſts, to wit, in the joynts, a calculous or ſtony matter, and there excites a ſtony or hard bulk.

The parts affected.

The diſtemper'd parts, whoſe pains are ſtirred up in the hauled Fibres, for the moſt part are the *Perioſtea*, or the heads clothing the Membrane of the Bones, and perhaps the *Tendons* and Ligaments there planted about. But ſometimes the pain in theſe parts, wholly depends upon a breach of the unity, and this proceeds from a certain matter being impacted in thoſe Bodies, or lying upon them; firſt of all we ſhall inquire, what ſort of morbific matter this is; ſecondly, from whence it comes; and thirdly, by what means it ſo ſtirs up periodical *Gouty* Fits, by breaking the unity in them.

The Morbifick Matter.

As to the *Morbifick* Matter it ſeems, firſt that it is not the Blood or nervous juice of it ſelf; nor is it one only ſimple humor laid up a part from the others. We deſervedly excuſe the Blood from this cenſure, becauſe theſe pains only infeſt Bodies for the moſt part without Blood; yea, and almoſt them only. For although in the neighbouring parts, by reaſon of the courſe of the Blood being hindred, ſometimes a tumor happens with an inflammation; yet this is not the Diſeaſe, but a *Symptom*, and for the moſt part comes upon the *Gout*. Further it appears, that the nervous juice (how ever ſharp, or biteing, or pricking, or pulling it is ſuppoſed to be) does not excite of it ſelf the pains of the *Gout*; becauſe then the Diſtemper would cauſe pains alſo, or as much in ſome other paſſages of the nervous parts, and alſo in the *Internodia* or knittings of the Bones.

It is not any ſimple or ſingular Humour ſuggeſted from any of them.

It is improbable, for the ſame reaſon, that any ſingular, excrementitious, or ſuperfluous Humor or Matter depoſited from the Blood or nervous juice, to cauſe the pains of the *Gout*. For if ſuch were only carried thorow the Nerves, it would excite pains by order, and a continual tract, not firſt in the feet or extream joints, but by irritating the nervous Stock in its whole journey. If that according to the opinions of *Hollerius*, *Sennertus*, and other Moderns, it be affirmed, that ſome impurities falling off from the heated Blood, and received by the joints, is the material cauſe of the *Goutiſh* pain; then it ſhould follow, that all who are greatly obnoxious to the *Goutiſh* Diſtempers, are alſo moſt prone to Feavouriſh burnings or heats; and that a Feavouriſh heat ſhould precede every aſſault of this Diſeaſe; neither of which to be true, common obſervation doth witneſs. For thoſe troubled with the Gout, as it were with a priviledge (to wit, by reaſon of the *Saline* diſpoſitions of the Humors) are free from a *Feavouriſh* Diſtemper. Further, the Fits of the *Gout* moſt often ariſe of a ſudden, without any great ſwelling up or ebullition of the Blood, and preſently at the beginning become very cruel; which alſo argues, that the Morbific Matter is not by degrees laid up in the diſtemper'd part, as in a Mine, and then to excite pains by its fulneſs. For if it were ſo, the beginnings and the increaſe of the Diſeaſe, being always made *gradatim*, they would be longer and more durable; nor doth the diſtemper (as it often is wont) being preſently vehement, by and by change its ſeat, and quickly vaniſhing in one place, anon ariſe up in another.

In the Mine of this Diſeaſe two humours concur, and mutually grow hot.

When therefore any ſingular humor (of which ſort ſoever it be ſuppoſed) ſeems not efficacious enough, for the proviſion of the Fits of the *Gout*; we may affirm, That in the neſt or mine of this Diſeaſe, (whether it be one or many), that many fermentative juices, and thoſe not eaſily to be mixed, do meet together; then from the ſtriſe and growing hot of theſe, the painful Vellications or pullings of the nervous Fibres do ariſe.

In like manner, as when the Spirits of Vitriol are poured upon Oyl of Tartar.

Formerly diſcourſing of the wandring *Scorbutick Gout*, and the *Rheumatiſm*, we plainly ſhewed what was alſo the cauſe of this *Gout*, of which we now treat; *viz.* foraſmuch as it appears by a very vulgar experiment, that ſalts being put in a diverſe ſtate, to wit, ſome of them being fixed or *Alchalizate*, and others having gotten a flux, or ſharp, or acetoſous things, being put together, do very much boil up and grow hot, and their humidity cauſing a white and hardiſh *Coagulum* or curdling; as for inſtance well known, when the ſpirit of *Vitriol* is poured to oyl of *Tartar*, it manifeſtly appears; and why may we not think, that in the fits of the *Gout*, there is ſomething like it? to wit, that from the fighting and mutual conflict of the Liquors, which are of a diverſe *Saline* nature, the nervous Fibers are pricked and provoked, and at length, from the various *Coagulations* of either juice, that there is ſometimes heaped together in the diſtemper'd places, a *Calculous* or ſtony matter.

A Vitriolick Matter partly ſupplied from the Nervous Liquor.

That we may ſhew the genuine matter of the *Gout*, we ought to referr hither, what we have elſewhere ſaid, concerning the nouriſhment of the ſolid parts. For indeed, we have ſhewed, that to that office both the Blood, and the nervous Liquor do bring their

their tributes; to wit, when the nouriſhing juice is carried from the Blood, thorow the Arteries, to all the parts of the whole body, another liquor being depoſited from the Brain, thorow the Nerves, and their dependences, doth actuate that former, as it were with an inſpired ſpirit, ſo that it is made full and fertil, and ſo more eaſily inſinuates into the Pores and paſſages of the part that is to be nouriſhed, and is aſſimilated into its ſubſtance. There will be no need to repeat here what we have formerly diſcourſed at large; as to what reſpects the preſent matter, we ſhall take notice, that the nutritious humor, diſtributed from the blood, conſiſts of a little Spirit, but of more plenty of Water, Earth, and Sulphur, and moderately of Salt, ſomewhat volatile; further, whilſt the nutritious humor is diſtributed, for that its Particles, which are for the cheriſhing or nouriſhment of any part, ought to be proportionate, and to remain like it ſelf; therefore, whilſt the ſpirituous are deſtinated to the Brain, and the ſulphureous to the fleſh, the inwards and the fat, it is behoveful, thatthe moſt *Saline* and more fixed, ſhould be laid up about the jointings of the Bones, and then growing full with the nervous liquor, to be aſſimilated with them.

Either Matter, growing degenerate or depraved, turns to the Gout.

1. From the Blood, for that it becomes full of a fixed Salt.

2. From the nervous Liquor, for that it is acetoſous or ſharp.

But if by reaſon of the vitious *Dyſcraſie* of the Blood, it happens that Particles ſaltiſh above meaſure, and fixed, ſhould be laid up in the joints, and by reaſon of their incongruity are not preſently aſſimilated; they ſoon after grow together into an heap, or a certain Morbific mine. But the Fit of the *Gout* is not wont for that reaſon to be excited, but an heavineſs only and languiſhing of the diſtemper'd member, which is oftentimes taken away by abſtinence, or exerciſe, or Phyſick; the ſtrange Particles being diſcuſſed, or ſupped back again into the Blood.

But if the Particles of the nervous liquor degenerate from a volatileneſs into an acetous Flux, a flowing ariſing from thence, they fall down in too great plenty into the little joints, and becauſe they there grow hot, with the *Saline* or *Lixivial* Mine, there before laid up, they ſtir up the Fits of the *Gout*.

The former is, as it were, the feminine Seed of the Gout;

The other maſculine.

The *Saline* or *Tartarous* Matter therefore being laid up from the Arterous Blood, about the jointings together of the Bones, is as it were the feminine ſeed of this Diſeaſe; which notwithſtanding, though there be heaped together a great plenty of it, is of it ſelf wholly unfruitful, like an Egg without a Cock; until the nervous liquor growing turgent, ſends its acetoſous Recrements falling from it, into the neſt of the former; which immediately, as it were the maſculine ſeed, renders the other prolifick. For inaſmuch as thoſe two Particles which are of a different ſtate and original, do meet together, and mutually concur, they pull or haul the Fibres of the Membranes and Tendons, and ſo ſtir up the fit of the Gout; the allaying of which, wholly depends upon the mutual ſubaction or bringing under, and the diffiation or blowing away of the moſt ſharp Particles of either kind.

The Procatartick, or foregoing Cauſes of the Gout.

Theſe things concerning the formal reaſon, and the conjunct cauſe of the *Gout*, being thus laid down, we will proceed to the further unfolding its *Procatartick* or foregoing cauſes: And we ſay, that theſe are a *Saline* matter, laid up from the Blood in the joints, and *acetous* or ſharp Recrements, ſent into the ſame neſt, from the ſwelling up of the nervous liquor.

1. A Mine of fixed Salt laid up about the Internodia, *or Knitting togegether of the Bones.*

This Matter is not meerly Excrementitious,

Firſt therefore, that this ſort of *Saline* Mine is laid up about the jointings or knitting of the Bones together, is plainly argued by the ſudden and unlook'd for aſſault of this Diſeaſe, and from its difficult cure; for the matter doth not flow into the diſtemper'd part altogether, and at once, in ſuch abundance, that it ſhould excite a fit ſo grievous and tedious; beſides, for that the pains are repeated ſtill within the accuſtomed neſt, it ſeems that their fetation or hatching doth moſt certainly depend upon the Egg ſomewhere laid up before hand. But that this matter is not merely Excrementitious, but a portion of the nouriſhing juice, degenerate towards a fixed Salt, being deſtinated to the ſame bony parts, we may lawfully conjecture, becauſe an humor merely Excrementitious, would cauſe in the diſtemper'd place, a continual trouble and tumor; moreover, this plainly convinces, from the cure of the *Gout*, by torture or cutting of the part: For *Authors* worthy to be believed, have told us in their writings, that the Member being cut off, in which the ſickneſs uſes to be, or greatly wounded, that the Diſeaſe has ceaſed without any relapſe; in like manner as a moſt grievous Tooth-ack, and continual, is moſt often cured by pulling out the diſtemper'd Tooth.

nor a Bilous or Phlegmatick Humour.

If that the *Goutiſh* humor were (as it is commonly ſaid) a *Cholerick*, or a *Phlegmatick* humour, or any other merely Excrementitious, it flowing afterwards to ſome other member, after the former diſtemper'd were cut off, would there excite a new Morbific Mine; but this happens only in ſome accuſtomed joints, for that this or that part is become more weak, and ſo admits into it ſelf the more eaſily, all other filthy portions; and neither aſſimilating nor ſending them away, ſuffers them to increaſe into a Morbific Mine. Further, the Recrements alſo of the nervous juice, that are ſharp and acetous, fall down more readily into the ſame part by reaſon of its debility. But

But to the *Saline Procatarxis*, or foregoing cauſe of this Diſeaſe, lying in the Joints; not only the weakneſs of the diſtemper'd member, but much more and firſt of all, the evil diſpoſition of the Blood doth help. We ſhall weigh a little the reaſons, and the manner how it is done, of either.

To this previous procatarxis, to wit, a fixed Salt, the Diſcraſie of the blood, and the debility of the Diſtemper'd Member doth help.

1. And in the firſt place, the fault of the Blood is, that its elementary Particles, and chiefly the Saline, are not in a fit ſtate or condition. For they ought to be within the maſs of the Blood, in the middle betwixt a fixed and a volatile conſtitution: they are called fixed, ſo long as the Sulphur and Earth being combined, do pertinaciouſly adhere to them; as it is obſerved in freſh and raw Urine, from which you ſhall not eaſily draw by diſtillation, either Salt or Spirit: But the ſaline Particles are votatiliſed, when leaving the Sulphur and Earth, they adhere to the ſpirituous, and with them fly away; as it is ſeen in the ſpirit of Urine, being diſtilled after a long digeſtion. Then there is a middle conſtitution between theſe, when the Saline Particles are ſo looſned and diſlocated from the Sulphureous and Earthy Particles, that upon occaſion they may be eaſily laid hold on by the Spirituous, and aſcend together with them; as it is in Urine putrefied by digeſtion, from which with a very little heat, you may force out Spirit and Salt. In like manner the Saline Particles in a living body, ſeem firſt of all to be in a degree of fixity, within the *Chyle*; from which, notwithſtanding, through Concoction in the Bowels, being rightly made, they begin to come forth a little. Secondly, theſe are made volatile in the nervous juice: And, Thirdly, they are of a middle conſtitution in the bloody maſs; to wit, which are exalted by a continual circulation or digeſtion, ſo that they are in ſome manner volatile, that being aſſociated, partly with ſpirituous particles, and diſtilled forth with them into the Brain, they go into Animal Spirits; and partly going into the nutritious juice, together with the ſulphureous and others, they increaſe in their nouriſhing the ſolid parts.

What the Saline Particles of the blood ought to be, to wit, in a middle ſtate, between fixation and volatiliſation.

But ſometimes it happens, that the ſaline Particles (at leaſt not all) are not rightly exalted within the bloody maſs, but remaining in a ſtate of fixity, give a beginning or cheriſhing to many Diſeaſes. That we may ſay nothing of the *Scurvy*, *Dropſie*, and many others, we only ſay for the preſent, it may be ſuſpected, that the firſt ſeeds of the *Gouti∫h* diſtemper depend upon this cauſe; for when the nervous juice, being deſtinated to the heads of the bones (where it is chiefly received) ought to conſiſt of very much Salt, there is a neceſſity, that its Particles, becauſe they are too fixed and thick, cannot be admitted preſently into the Pores and paſſages, ſhould increaſe into a Morbific Mine. Beſides, that more eaſily and more often happens, if the weak or broken Fibres of the bodies, planted near, cannot by wrinkling themſelves, ſhake off what is troubleſome or ſuperfluous.

When, being too fixed, they become Morbifick.

And ſo they bring forth the Scurvy, Dropſie, and other Diſeaſes, and eſpecially the Gout.

As to the ſecret leading or evident cauſes, from which the nutritious liquor being brought from the blood to the joints, is imbued too much with a fixed Salt, and by reaſon of which, theſe parts become too prompt and eaſie for the receiving what is improportionate to them, the chief of theſe, for that they are various and manifold, we will briefly touch upon.

The Saline fixed, or Arthritical Diſpoſition of the Blood, proceeds from various Cauſes.

1. And firſt of all, an hereditary diſpoſition is wont to produce either evil. For thoſe troubled with the *Gout*, for the moſt part beget Gouty Children, and this Diſeaſe deſcending from the Parents to the Children, is wont not only to have the like fruits in both, and alſo to ripen about the periods of the ſame age; but for the moſt part, it hath its firſt roots in the ſame members, and obſerves every where the like progreſſes: concerning the reaſon of which, I think, we have already ſaid enough, being the ſame as other Diſeaſes propagated *ex traduce*, or from the Parent.

1. *Sometimes it is Hereditary.*

2. But indeed, the *Gouty* diſpoſition is brought in oftentimes without any original fault, by reaſon of an evil manner of living, and errors in the ſix *non-naturals*. For thoſe who are given to Surfeiting and drinking much, and indulge their appetites by an inordinate eating and drinking, and eſpecially if they feed on ſalt and ſpiced meats, and guzle down great plenty of Wine, eaſily contract this Diſeaſe. For by this means, the *Chyle* is indigeſted, and indued with very unfit and untameable Particles, and ſo ill prepared in the Bowels; and then from a more liberal drinking of Wine, ſaltiſh ſettlements and heterogeneous feculences or dregs, which ſubſiſt ſomewhere in the firſt paſſages, being too much exalted, are carried into the Blood: to which enormities of living, if a ſedentary life, idleneſs, or ſleeping at noon be added, ſo that the ſuperfluities neither exhale, nor the *Saline* impurities are diſſipated by exerciſe, but left to ſettle about the joints, certainly too much of this *Alchaliſate* ſeed is ſowed for a plentiful harveſt of this Diſeaſe of the *Gout*.

2. *Oftentimes acquired, by reaſon of an evil manner of living.*

3. The debility of the little Joints, and *Gouti∫h* diſpoſition is not only hereditary, but excited frequently by reaſon of various occaſions. The falling down of the Morbific matter often induces this: for if by chance it happens, that at firſt, the fit of the *Gout*

From what Cauſes the debility of the Joynts is excited.

comes in this or that part, afterwards the peccant humor more eaſily falls down into the ſame member; and quickly conſtitutes, as it were, a neſt, where the Eggs may be continually laid up. Beſides, a ſolution or breach of continuity alſo, or ſome hurt inflicted on any joint, by wet, or cold, by a blow, or putting out of joint, oftentimes ſtirrs up the *Goutiſh* diſpoſition.

2. The other foregoing Cauſe of the Gout, from the acetous part of the nervous humour.

Secondly, But indeed, as the Blood brings a *Saline* Mine for the Morbid ſeed, and the Joints receive and hide it readily; yet this proviſion, without the coming of the other ſeeds, is like an addle Egg, wholly barren and unfruitful; becauſe, for the conſtituting of this Diſeaſe into act, it is required, that the nervous liquor, by chance ſwelling up or growing turgid, pours forth *Saline* impurities of another condition, to wit, acetous, falling away with a certain efferveſcency, or heat, and as it were a firing of the other Mine. Wherefore, we think good to ſet down this other foreleading cauſe of the *Gouty* Diſeaſe in the nervous humor, and its acetous or ſharp affluxions, or flowing to the parts.

Such an acetous diſpoſition does not come upon the whole Maſs of the nervous humour, but only ſome portions or recrements of it.

And indeed, that the *Saline* Particles of this Liquor degenerating from a *volatilization* to a flux, do become acid, we have ſhewed by very many inſtances and reaſons; both formerly, and alſo in this Tract. But for the proviſion of this Diſeaſe, it is not requiſite that the whole Maſs of the nervous juice ſhould be acetous; but it is ſufficient, that ſome portions of it in the Brain, or elſewhere in the nervous ſtock, being depraved, or that its Recrements laid up here and there, had contracted this kind of Nature, from which afterwards growing turgid, when as the acid Particles run together to the *Saline* Mine laid up in the Joints, they ſtir up the *Gouty* fit after the manner aforeſaid.

It is ſhewn that acetous fluxions do proceed from the nervous humour.

But truly, it manifeſtly appears, that *acetous fluxions* being brought from the nervous humor, do frequently happen; by a notable inſtance or experiment, often cited by me; *viz.* I have often obſerved, That thoſe obnoxious to the paſſions or pains of the Nerves, have ſuffered or felt a light rigor or ſtiffneſs in their whole Body (which is a corrugation or wrinkling of almoſt all the nervous parts) and then preſently, the Convulſive Diſtemper would follow; at which time the Urine was rendred very copiouſly and clear, which being without any lixivial or nitrous ſavour (which otherwiſe it always has) was very ſharp, like mere Vinegar: indeed by this moſt clear ſign it appears, that the humor being riſen up to a fulneſs in the nervous parts, and moved by its ſwelling up, doth bring in the Convulſive Diſtempers; and when a portion of the ſame ſweating or dropping forth, is laid up in the *Glandulæ*, immediately being reduced thence into the Blood, by the paſſage of the Veins and *Lymphæducts*, it did excite the flood of the ſharp Urine: Indeed in like manner, from the ſame humor ſwelling up in a leſſer meaſure, and ſtill remaining within the nervous paſſages, and ſetling in the Joints, we think the *Gouty* fits do ariſe.

And ſo part of the Gouty Mine is ſent from the Brain and Nerves.

Indeed it is an argument, that part of the *Goutiſh* matter doth proceed from the Brain and Nerves, becauſe for the moſt part, thoſe obnoxious to this Diſeaſe, do complain a little before the fit, of an heavineſs of the head, and of a dulneſs, with a *Vertigo*, and ſleepineſs; but as ſoon as they begin to ſuffer the pains of the *Gout*, as if the Clouds were blown away from the Brain, they enjoy a more free underſtanding, with a great and unwonted ſharpneſs of wit. Beſides, when as there are ſometimes many *Saline* Mines of this inveterate Diſeaſe, depoſited in diverſe Members, it is obſerved, that the pains do very much invade, firſt the ſuperior places, and then by degrees deſcend to the reſt; wherefore, when perhaps at firſt the *Vertebræ* of the neck were troubled, a little while after the ſhoulders, or other members of the Arm were poſſeſſed, then the Diſeaſe reached to the Loins, or the Hips, and laſtly the joints of the Legs, and ſo to the loweſt joints, ſometimes theſe, and ſometimes thoſe.

The evident Cauſes of the Goutiſh Fit.

The *Evident Cauſes*, which in reſpect of the nervous liquor ſtir up the *Gouty* Fits, do either pervert the Particles and portions into an Acetouſneſs, or elſe ſtir them up before degenerated into Fluxions.

1. The drinking of ſharp Liquors.

1. Acid liquors, as thin Wines, Cyder, ſtale Beer (experience being miſtreſs) are to be ſhunned by *Gouty* perſons, more than a Mad-Dog, or a Snake. For theſe kind of Drinks do not only bring into act the cauſe of this Diſeaſe, but contribute more Acetous Particles, (by carrying them to the Brain, and nervous Fibres) to its neſt, and increaſe the Morbific matter.

2. Immoderate Exerciſe.

2. Immoderate or unſeaſonable exerciſes of the Body, violent paſſions, immoderate Venus, and a diſorderly feeding, and whatſoever beſides greatly diſturbs the ſpirits and humors or ſhakes them, and by that means ſtir up the fluxions of the nervous juice or its recrements, induce the pains of the *Gout*.

3. Evacuations being ſuppreſſed.

3. Uſual evacuations being ſuppreſſed, alſo taking of cold and wet, for that by this means the blood, and by conſequence the nervous liquor, conceive efferveſcencies and fluxions, do bring on the fits of this Diſeaſe.

4. For

4. For the ſame reaſon, the changes of the Heaven and of the Air, as alſo the *Tropicks* of the year, are wont to bring on the pains of the *Gout*; ſo that it is become a Proverb, That *Gouty* perſons carry their *Almanack* in their joints; and deduce moſt certain *Prognoſticks* of the weather, from their pains: For as often as the humid conſtitution of the year, or the blowing of the Southern, or the Northern Winds, or Snow, are at hand, they are wont to predict theſe from the coming of their pains. Further, every Quarter of the Year, eſpecially Spring and Fall, they are more grievouſly tormented. Wherefore the *Æquinoxes* are always religiouſly obſerved by them. The reaſon of theſe conſiſts partly in this, foraſmuch as inſenſible perſpiration is variouſly altered, by reaſon of the mutations of the Air and Year; therefore the Effluvia's which are wont to tranſpire, being reſtrained, do ferment the Blood and the nervous Humor, and eaſily ſtir them up into *Gouriſh* Fluxions. Beſides, the humors of our Bodies, even as the Sap of Vegetables, and other natural and artificial Liquors do diverſly grow hot, about the changing of times, and enter various ſtates or conditions of either fixation, or ſometimes of volatileneſs, or of a flux.

4. The Circulations of the Heaven, Air and Year.

The chief differences of this Diſeaſe, are taken from the diſtemper'd places, and ſo there are ordained as it were diſtinct *ſpecies* of the ſame, to wit, the *Chiragra* or Hand *Gout*, the *Iſchia* or Hip *Gout*, the *Gonagra* or Knee *Gout*, and the *Podagra* the Foot or Toe *Gout*; in the mean time, pains are wont to be excited in ſome other members, and are noted by the common name of the *Gout*. Whether the pains of the Teeth, or of the Loins, and pains of other parts ought to be referred hither, we have not now leſure to inquire.

The differences of the Gout.

1. As to the places affected.

This Diſtemper, as to its original, is ſaid to be hereditary, or acquired; as to the temperament of the ſick, it is Hot or Cold, or *Sanguine*, *Cholerick*, or *Phlegmatick*, to wit, becauſe the Blood being hindred in its circuit, about the diſtemper'd places, ſometimes an Inflammation, or a watry ſwelling come upon the pains.

2. As to its Original.

As to the relation of other Diſeaſes, the Diſtemper of the *Gout* is either ſingular, or elſe complicated with other Diſeaſes, and chiefly with the *Scurvey*, or the Stone. Of which kind of combinations, becauſe they are intimate and frequent (as if they were of kin to this Diſeaſe) it will ſeem to the purpoſe, for us to inquire into the reaſons.

1. In reſpect of other Diſeaſes.

A long *Gout* oftentimes gets to it the *Scurvey*, and ſome *Scorbutick* Diſtempers are ſo like the *Gout*, that they are not eaſily diſtinguiſhed. The reaſon of the former is, both the like *Dyſcraſie* of the Blood in either Diſtemper, depending upon a fixed Salt, as alſo for that *Gouty* people, being for a long time fixed either to their Bed or Chair, the *Scorbutick* diſpoſition eaſily comes upon them. Secondly, The *Scorbutick* Diſtempers which imitate the *Gout* are the *Rheumatiſm*, and the wandring *Scorbutick* Gout; the reaſons and cauſes of which, and how they may be diſcerned from the *Gout*, we need not repeat here, having already delivered them in our tract of the *Scurvey*.

It is wont to be complicated with the Scurvy.

The *Gout* hath ſo near a relation to the *Stone*, or *Gravel* in the Reins, that either diſtemper, as if they had the ſame original, moſt often meet together; for ſcarce any is ſick of the *Gout*, but is found to be alſo obnoxious to the other Diſeaſe. Further, an inveterate *Gout* is wont to excite ſtony Concretions in the Joints, ſuch as the *Stone* doth in the Reins. Hence I think it is moſt likely, that the *Stone* or Gravel in the Reins, doth ariſe from a like, if not wholly the ſame cauſe, that we aſſigned for the *Gout*, to wit, the Saline fixed matter, being depoſited from the Blood, in the Reins, doth grow hot with the acid humor, being there poured forth thorow the nervous paſſages, and by that means doth frequently induce *Nephritick* pains, or of the Reins; then, from either matter being coagulated, after growing hot, doth form the Stone. For the illuſtrating this *Pathology* farther, (here being no place for it) it ſhall be deferred to another time.

2. With the Stone.

The Reaſon of this is ſhewed.

Every Body is wont to give a *Prognoſtick* of the *Gout*, to wit, that it is ſafe enough, but moſt hard to be Cured. 1. As to the former, this Diſtemper is not only free of it ſelf from danger, but on the contrary, preventeth moſt other Diſeaſes. For *Gouty* people, by reaſon of the *Saline* fixed *Dyſcraſie* of the Blood, are little obnoxious to *Feavours*; but for the moſt part live free from a Conſumption, and other more grievous Diſtempers of the Bowels or Head; becauſe the Recrements of the Blood and nervous Juice are continually laid up in the Joints. 2. But as to the latter, the ſo great difficulty of Cure, the reaſon is, that for the taking away the foregoing cauſe of this Diſeaſe, there is required a moſt perfect amendment, of a double Humor, *viz.* of the Blood and nervous Juice; to wit, that they may beget no *Saline* fixed or plainly acid Particles; and moreover, a reſtitution of the weakned Joints; neither of which can ever be eaſily obtained. And beſides this, it happens, that the Conjunct Cauſe of this Diſeaſe ſubſiſts in places greatly at a diſtance, ſo that the virtues of no Medicine are able to reach them.

The Prognoſtick of this Diſeaſe.

The Gouty Matter being restrained, or any other way translated, oftentimes excites dangerous Distempers.

Sometimes it happens, by reason of the Fluxions of the *Gouty* Matter, being suppressed or beat back, that sometimes torments of the Ventricle, of the Bowels, and of the Belly, sometimes a straitness of breathing, an *Asthma*, or other Distempers of the Breast, and sometimes also an *Apoplexy*, and other sleepy, or Convulsive Diseases are excited; which being observed, it may be objected, that the Mine of the *Gout* is not the same as we but now described: because its *Saline* part, if it were the same which is destinated for the nourishing of the Joints, would not be from thence expelled or deferred, or laid up elsewhere; then as to the other part, to wit, the laying up of the acid seeds in the accustomed place, it seems that it should not be easily repercussed, or of it self suppressed in its way, or any where else translated, to be very hurtful to any part. But indeed, it is easie to reply to this, that an acetous portion of the *Gouty* Matter, may be repelled or suppressed, flowing thorow the nervous passages, and so it being poured into other parts, doth oftentimes excite most grievous evils. Indeed the nervous Liquor and its Recrements, for that they consist of very subtil and active Particles, upon every light stop or repulse, are driven into diverse deflections and flowings; moreover, when these grow turgid, or meet with the Particles of humors of another kind, and grow hot with them, they stir up various Distempers, or such as are painful and Convulsive; and not rarely, because the dissimilar Particles are mutually coagulated, sometimes *Strumous*, sometimes *Cancrous*, or otherways malignant Tumors arise. Instances very remarkable of these kind of effects, we have shewn in our Treatise of *Convulsive Diseases*; But especially concerning a Maid, who by reason of the *Inguinal Glandulas*, or the Kirnels about the Groin, being hardly pressed and hurt with a Truss for a Rupture, fell into a *Vertigo*, and Convulsive Distempers, and shortly after had great *Scropula's*, or running Sores, growing on the same side, in the Neck. After the same manner, by reason of the *Goutish* Mine being restrained from its wonted place, and suppressed within the nervous Passages, or otherways translated sometimes most wicked Distempers arise.

The acetous recrements of the nervous Liquor do chiefly effect this.

The first Instance of such an Effect.

A second Instance.

Whilst I was writing these, I was sent for to a Noble Matron, who sometimes past being obnoxious to the *Gout*, and that very much, after about three months last past, she had laboured almost continually with a languishing of the Ventricle, with a queasiness, nauseousness, and vomiting; at length, I know not upon what occasion, falling into frequent swoonings or loss of spirits, a little after she was troubled with a *Vertigo*, with a loss of memory, and sometimes with a light *Delirium*; and when she had continued thus for some days, and free in the mean time from the *Gout*, and growing well in her stomach, she eat with an appetite broth twice or thrice in a day, and once a day flesh meat, and digested it without any trouble: by this manifest sign indeed it appears, that the Recrements of the nervous humor, which were wont before to fall down by the *Spinal* Nerves into the Feet, to the Mine of the *Gout*, afterwards being deposited in the *Ventricle*, thorow the Nerves of the wandring pair, and the *Intercostals*, did stir up the continual troubles in it; which at last partly restagnating in the Brain, and being partly translated into the *Cardiack* Nerves, (or those going to the Heart) those last Distempers of Swooning, of the *Vertigo*, and the *Delirium* succeeded.

The Cure.

The *Curatory* method suggests three primary *Indications*, the first of them *Curatory*, to be administer'd only in the Fits, for the allaying the pains, and for the sooner ending of them. Secondly, *Preservatory*, being destinated for the intervals of the fits, endeavours the taking away of the foregoing cause of the Disease, that the fits of the pains may more rarely, or less, or not at all be repeated. Thirdly, *Vital*, which institutes, by what kind of food, and by what Remedies, strength may be sustained in the cruel Torments, and life be prolonged, and also refreshed or cherished, notwithstanding the frequent and almost continual troubles of the Disease.

Three primary Indications.

1. Curatory, for the allaying the pains in the Fits.

1. The first *Indication*, to wit, the allaying of the pains, contains these two chief intentions, to wit, that the breach of the unity be taken away; and in the mean time, that the irritation, or the growing hot of the Fibres, or of the Spirits flowing in them, may be quieted or appeased.

1. For the taking away of the Breach of the Continuity.

1. For the taking away of the breach of the unity in the distemper'd places, both the flowings of the humors, which are apt to tend thither, ought to be hindred, and the Mine already impacted to be dissipated, and shaken off, and its Particles suppressed, from their mutual effervescencies or growing hot. For these ends are destinated, evacuating and altering Remedies, and of either both internal and external. We shall here add some forms of these, and the more select ways of administration, in their order.

Phlebotomy.

Phlebotomy or letting of Blood, in a fresh *Gout*, or not very inveterate, and especially in a more hot constitution, being used about the beginning of the Disease, doth often bring help; but in an habitual Disease, and in a frigid temperament, and old age, it

is

is wont to be more hurtful than profitable; because it depresses the vigor of the Blood, and of the Spirits, not too much raging, without a lessening of the Morbific matter.

The business is very much controverted concerning Purging about the beginning of the Disease, whilst some *Physicians* most strictly abstain from all Purging, before the declination or end of the fit; others on the contrary, constantly give strong Purges about the beginning of the Disease, and oftentimes with good success. The reason of the difference seems to be placed chiefly in this, to wit, because some *Gouty* persons are yet firm in the constitution and tone of the humors, and the Vessels containing them, and being not yet weakned in their joints, as often as the Blood and nervous Liquor are disturbed by Medicines, their superfluities and recrements are not presently precipitated into the Mine of this Disease, yea these being provoked by the Medicine, and also obeying the incitement, are drawn forth by the mouths of the Arteries, into the cavities of the *Intestines*; and in the mean time, the Vessels being emptied, they draw or sup back a certain part of the Morbific Matter. But it is otherwise in tender and weak Constitutions, for from the least commotion of the Medicine, the purgings of either humor fall down into the *Gouty* place. Therefore to whom Purging is convenient, it ought to be instituted with the more strong Medicines, and *Elaterium*. For this matter, these are of known use. The Electuary *Caryocostinum*. The Purging Syrup *de Ramno*. Pills of *Hermodactyls*. The Compounded Pill *ex Duobus*. The Pill of *Rhasis*; which if we may believe the Author, will quickly make the sick to walk. Take *of the best Aloes half an ounce, of red Roses two scruples, of Hermodactils barkt one dram and a half, of Diagridium one dram, of Honey of Roses what will suffice; make a Pill.* *Roderick* of *Fonseca*, wonderfully crys up the root of black Hellebore, and among other things, an Apple with its small strings put into it, to about half a dram, roasted under the ashes, and so eaten.

Purging.

Forms of Purges.

Take *of Calomelanos one scruple, of the Resine of Jalap three grains, or of Scammony three grains, of the Oyl of Cloves one grain, of the Balsom of Peru what will suffice; make three or four Pills, for one Dose.*

In the time of Purging, it will be of some moment, perhaps, as *Solenander* advises, to restrain the falling down of the humors into those places, by a Plaster, or other defensive Medicine, laid upon the distemper'd places.

Vomiting, to whom it is wont to be safe and easie, may be also convenient in this Disease; for which end, the *Emetick Tartar* of *Mynsicht*, the *Sulphur* of *Antimony*, or its *Flowers*, *Mercurius Vitæ*, *Vinum Emeticum*, *Gambogia*, may be administer'd.

Vomiting.

But in the *Goutish* fit, the Powders of Stones, Bones, and Shells, as also of sharp Vegetables, do help; which being called the *Alexiteria* of this Disease, subjugate all the Particles, and by growing hot with them, do as it were mortifie them, and at last they being overcome, they carry them forth either by Urine or Sweat.

Altering Medicines, or such as preserve from the Gout.

Take *of the Powder of Crabs claws compounded two drams, of Ivory, of the Root of Cretick Dittany, of the Root of male Pœony, each one dram; of the Wood of Aloes, of yellow Saunders, each half a dram; make a Powder, let it be taken half a dram or a dram, either by it self, in a spoonful of red Poppy Water, drinking after it six spoonfuls of the same, or let it be reduced into a Bolus, or Pills, with Andromach Treacle, or Venice Turpentine what will suffice: the Dose one dram twice a day, drinking after it of the distilled Water afterwards described two or three ounces.*

Pills.

Or Take *of the same Powder six drams, of the Conserves of Gilliflowers, and of Betony, each one ounce and a half; of Diascordium one dram, of the Syrup of Poppies what will suffice; make an Electuary: the Dose one dram to two, Evening and Morning.*

An Electuary.

In the mean time, while these things are doing, besides, altering Medicines, and allaying, have their turns, for the calling away to some other place, the flowing of the Morbific matter into the places distemper'd, or for the carrying it forth; such as may allay the swelling up of the Blood, and the nervous Juice, and stop the Fluxions of the Recrements falling from them; for this end a slender diet, and spoon meat (if it be convenient) being ordered; let *Emulsions*, *Julets*, and *Apozems* made of gentle things, and *Anodynes*, be prescribed.

As to what belongs to the other intentions of healing, *viz.* the Discussion of the impacted Mine, and for the allaying the burning or growing hot of the Fibres and the Spirits; this latter must be endeavoured, without which, being performed, the other intention will not satisfie: for this end therefore it is expedient, to give both external Medicines, *viz.* *Topicks* of a various kind; as also internal, *viz.* *Hypnoticks*.

2. *The Spirits ought to be allayed, or quieted.*

For that there are an immense company of *Topicks*, these are only *Anodynes*, which respect

1. *By Topick Remedies.*

ſpect only the pain by it ſelf, or are ſuch as aim at this together, and the tumor; or they are repelling, or reſolving, and diſcuſſing: There are various *Formula's* of every one of theſe, and ways of adminiſtrations: But the chief in uſe are *Fomentations*, *Pulteſſes*, and *Plaſters*; of theſe we ſhall ſhew the moſt celebrious; and firſt of all, *Anodyne* Applications, which pleaſe the Fibres with a certain delight. For this uſe the moſt common practice with the vulgar are, *Cataplaſms* or Pulteſſes of Milk and crums of Bread, or of thoſe with a *Muccage*, or jelly of the leaves and of the roots of Mallows, and Marſh-mallowes, and ſuch like.

Pulteſſes.

Others praiſe a Pulteſſe of the freſh dung of a Cow applied warm.

A Fomentation.

Take *of the Water of Nightſhade, and of the Sperm of Frogs, each ſix ounces; mingle them: Lint being dipt in this, let it be applied warm.*

Take *of red Lead three ounces, of diſtilled Vinegar one quart; let them digeſt for ſeveral days; and uſe this liquor by it ſelf, or elſe the water drawn of by diſtillation.*

Alſo a *Water* diſtilled, made of a *Tincture* of *Verdigrieſe*, diſtilled in *Vinegar*, often times allays the pains.

I had from a Gentleman, oftentimes heavily obnoxious to the *Gout*, that he in the moſt cruel torments of this Diſeaſe, had always preſent eaſe, from a Fomentation, of the water diſtilled from the contents in the ſtomach of an Ox freſh killed.

Outward Narcoticks.

For the extream torments of the *Gout*, outward *Narcoticks* ought ſometimes to be applied. Take *of the leaves of Henbane, and of Hemlock, each three handfuls; let them be put into boiling water, and as ſoon as they grow tender let them be taken out:* Theſe being bruiſed, add to them, *of the Powder of Chamomel flowers about two drams, and the yoalk of one Egg; make a Poulteſſe.*

Or take *of the Tincture of Saffron, made in the Spirit of Wine four ounces, of Camphor, of Opium, each one dram; let them digeſt cloſe ſhut and warm, till they are diſſolved*; anoint the pained part with this liquor. There are to be found other innumerable Medicines of this ſort in Medical Books, and are every where ordinary, and wont to be preſcribed almoſt by every vulgar perſon; which alſo ſuffices for the fulfilling of the other Intention, to wit, the repercuſſion of the Humors, when it is ſeen neceſſary.

Reſolving Topicks conſiſting chiefly of Saline Particles, even analogic, or correſpondent to the Morbific Mine.

As to what reſpects *Reſolving* and *Diſcuſſing Topicks*, they are not required to be of the ſame kind, which open only the Pores, and evaporate the *Serum*, and make the Blood circulate, as in an Inflammation, or a white hard ſwelling; but whoſe *Saline* Particles, being deſtinated for the oppoſing thoſe Salts of the *Goutiſh* Mine, may either by embracing them carry them forth of doors, or by precipitating them may ſuppreſs them from their painful heats. Wherefore in this Diſeaſe, when Fomentations or Pulteſſes of *Chamomel*, *Mallows*, *Marſh-mallows*, *Line* and *Fenegreek* ſeeds, bring little or no help; yea by looſning the nervous parts, do oftentimes much hurt; the Salt of *Armoniack*, or Sea Salt, or *Nitre*, or of *Vitriol*, quick Lime, and diſſolutions of the like, or diſtilled Liquors, always troubleſome to other humors or pains, are wont to give the greateſt help.

Forms of theſe.

Theſe kind of Liquors in the *Goutiſh* Fits, to be applied to the grieved part, are variouſly preſcribed, by *Quercitan*, *Crollius*, *Hartman*, and other *Chymiſts*; and as other famous *Phyſicians* have often found them by experience good, and approved of them, we may conclude that they are helpful for the aforeſaid reaſon.

There will be no need here to repeat the forms of theſe, though I could eaſily ſet down many other preparations of this ſort; yet I ſhall here give you one or two of them only.

Take *of Sal Tartari, and Armoniac powdered, each two ounces; put them into rain or ſpring water two quarts, and with a linnen cloth dipt in it warm, apply it.*

Take *of the Spirits of Vitriol not rectified one pint, of Sea Salt calcined and powdered one pound; diſtil them in a Glaſs retort in ſand; a very pure Spirit of Salt will come forth, which being expulſed from its lodging by a Vitriolick Stagma, leaving the poſſeſſion, eaſily aſcends: To the dead head pour two pints of the Spirit of Wine, digeſt it cloſe and warm, adding of Camphor two drams; let it be applied warm to the grieved part with linnen rags.*

Take *of the Filings of Iron, of the Flowers of Sal Armoniack, each ſix ounces; mingle them well by pounding them together; let it be diſtilled in a Glaſs retort till the Flowers are ſublimated; to the Caput Mortuum being pounded, pour the Spirits of Wine, digeſt it, and keep it for uſe.*

I have

I have heard of ſome that for the allaying of the pains of the *Gout*, have incloſed the diſtempered foot in a little Bay, filled with Sea Salt calcined and powdered; from which they have ſtill expected a certain and ſudden help.

In the declination of the Fit, for the ſtrengthening the part, and for the ſhaking off the reliques of the Morbific matter, Plaſters are profitably applied; which however are not all convenient to all, but for ſome more, for others leſs hot; But the moſt efficacious to moſt people are thoſe in which are *Red Lead*, *Ceruſe*, and *Soap*, boiled with *Oyl*. Or Take *of the Plaſter of Red Lead two parts, of Paracelſus one part, mix them, and ſpread them upon Leather.* *Plaſters in the declination of the Fit.*

2. Internal Remedies for the pains of the *Gout*, that are made uſe of, are only *Narcoticks*, or ſuch as ſtupefie, which ſought to be adminiſter'd in cruel and long torments. Of theſe we ſhall chiefly commend Preparations of *Opium*, with *Salt* of *Tartar* or its *Tincture*. Further, for this uſe, the *Laudanum* of *Paracelſus*, or that of *London*, Pills of *Styrax*, and *Cynogloſs*, or Dogs Tongue, Syrup *de Mœconio*, or of Poppies, *Treacle Andromach*, and *Diaſcordium*, are wont to be helpful or give eaſe. *Opiates.*

The Indication *Preſervatory*, or ſo called, reſpects the taking away of the foregoing cauſes of the *Gout*; wherefore, that the fits of pains may more rarely, or leſs or not at all infeſt them: For this end, *Evacuating*, *Altering*, and *Corroborating* Remedies, together with an exact dyet, are preſcribed to be given out of the Fits. *2. The preſervatory Indication, out of the Fit.*

1. *Gouty* people therefore ought conſtantly to be purged Spring and Fall; and then alſo it will be expedient to Vomit, if nothing gainſays it; and ſometimes afterwards at intervals, to repeat them. Let thoſe who are indued with a more ſtrong ſtomach and *Præcordia*, take Emetick Minerals prepared out of *Antimony* or *Mercury*. Thoſe who are of a more tender conſtitution, may take after the eating of ſlippery meats, Wine of *Squills*, or the Salt of *Vitriol* with Poſſet-drink; and then the ſtomach being filled with warm water, or ſimple Poſſet-drink, or with the leaves of *Carduus* boiled in it, let Vomiting be twice or thrice or oftner provoked. For Purging to be often celebrated alſo at convenient times, between, the forms of purging Medicines already preſcribed are convenient enough. Or Take *of the ſtrings of black Hellebore cleanſed one ounce, of Lignum Aloes and of Cloves, each two drams, bruiſe them, and pour to them of the Spirits of Wine, not rectified, one quart; let them digeſt warm and cloſe ſhut, for ſeveral days.* The Doſe two or three ſpoonfuls in the morning, twice or thrice in a week; and let Vomiting and Purging be always begun before the *Æquinoxes*, leſt perhaps the Fit being firſt begun ſhould pervert the courſe of the Medicine. *Uſual Purging and Vomiting.*

Letting of Blood, or the opening of the *Hemorrhoidal* Veſſels, are ſometimes convenient Spring or Fall, in an hot temperament, and for ſuch as are indued with a more ſharp Blood. *Cauteries*, made in the Arms, and between the ſhoulders, are profitable to every one almoſt obnoxious to this Diſeaſe. *Phlebotomy.*

But beſides, altering Medicines, *Antidotes* ſo called by the Ancients, againſt the *Gout*, are of known uſe; and in a long time, together with an exact method or Government concerning the ſix *non-naturals*, often bring great help; in this rank the chief are Medicines indued with a *Volatile Salt*, and *Balſamick Sulphur*, foraſmuch as theſe exalt the fixed Salt, and reduce what is *Acetous*; beſides, bitter and aſtringent things, as theſe Herbs, *Chamæpitys*, *Centaury*, *Germander*, the Roots of *Gentian*, and *Ariſtolochia*, or *Birthwort*, *&c.* (as by experience has been approved of in this Diſeaſe) for this reaſon ſeem to be profitable; becauſe they help the offices of *Concoction*, and *Chylification*, or making of *Chyle*; and reſtrain the *Saline fixed feculencies* or dregs, that they may not be carried into the Blood. We ſhall here ſet down ſome forms of each of them. *Altering Medicines called Antidotes of the Gout.*

Take *of the Powder of Chamæpitys ſix drams, of Crabs Eyes two drams, of Venice Turpentine what will ſuffice, make ſmall Pills, take three or four Morning and Evening, for thirty or forty days, drinking after them of the following diſtilled water two or three ounces.* *Pills.*

Take *of the leaves of Cypreſs Tree, of the Aſh, and of Miſleto of the Apple tree, each ſix handfuls; of the roots of ſweet ſmelling Avens, Burdock, each one pound, the outer rinds of ten Oranges, and of ſix Lemons, of Nutmegs, and Mace, each one ounce; let them be all cut and bruiſed, and pour to them ſeven pints of new Milk, and of Malaga one pint; let them be diſtilled according to art, and the whole liquor mixed together.* *A Diſtilled Water.*

Or let there be a ſimple Water prepared of the leaves of Burdock, by pouring it twice or thrice upon freſh leaves.

Take *of the Powder of the Seeds of Burdock ſix drams, of Crabs Eyes two drams, of Nutmeg half a dram, of Capive Balſom what will ſuffice to make a Maſs, which form into ſmall Pills: let four be taken Evening and Morning for many days.*

Take *of the Tincture of Antimony one ounce; the Doſe twenty drops to twenty five, Evening and Morning, with three ounces of the water but now deſcribed.* *Tinctures.*

For

Powders. For poor people I was wont to preſcribe after this manner. Take *of the Powder of the leaves of Sage half a pound, of Crabs Eyes, and of the Sugar of Cryſtal, each two ounces; mix them; let it be kept in a Glaſs, and take one ſpoonful twice in a day, with a draught of a Decoction of the leaves of Sage, or of the roots of the Burdock.*

Or of the Powder of Dorncrellius preſcribed to be taken after the ſame manner.

Take *of the Powder of the leaves of Germander, of Gout Ivy, of the leſſer Centaury, of Marjoram, of Sage, of Betony, of the roots of Gentian, and of round Birthwort, each one ounce; of Sugar one pound; mix them and make a Powder.*

Or of the Powder of John Anglicus, *called by himſelf Saracenick.*

Take *of the Powder of the leaves of Chamæpitys, one ounce, the bones of a Mans foot burnt two drams, of Liquoriſh three drams, mix them.*

Medicated Beer. For ordinary drink, let there be prepared a *Bochet* of *Sarſaparilla*, of *Saunders*, wood of *Rhodium*, ſhavings of *Ivory*, *Harts-horn*, *&c.* or let there be prepared *ſmall Ale*, in a Veſſel holding about four gallons, inſtead of *Hops* let their be boiled the leaves of *Germander* and *Chamæpitys*, and after it has work'd, put into it of the leaves of dry *Sage* four handfuls, of *Saſſaphras* two ounces, of the roots of ſweet ſmelling *Avens* eight ounces.

A Milk Diet. Among *Altering* Medicines a *Milk dyet* has not the laſt place, that the Patient ſhould uſe for three or four Months, no other food: let him drink Morning and Evening new Milk from the Cow; about noon, and at other times, let him eat white Bread boiled in Barly, or Water-gruel of Oatmeal: I have known ſome by this kind of dyet to have received notable help; but others, to have received much hurt or to grow worſe, by the uſe of Milk, and the *Gout* being nothing cured, to have contracted great obſtructions of the *Viſcera*, and a *Cachochimical* diſpoſition or fulneſs of evil humors. Therefore this method is not raſhly to be entered upon, without the counſel of a prudent *Phyſician*, and by a ſedulous obſervation, whether it be convenient or not.

Drinking of ones own Urine. Of late it has been a common cuſtom, for people having the *Gout*, to drink every Morning their own Urine; which I know has been beneficial to ſome. The reaſon of which help ſeems to be, becauſe the *Saline Latex* of the *Urine*, paſſing thorow the Blood, doth carry with it to the Reins, the *Saline fixed* Particles that were before wont to be carried into the joints. Wherefore, this method, when it is helpful to the diſtemper of the *Gout*, for the moſt part encreaſes the *Stone*: which I think ſufficiently appears from the following Hiſtory.

A notable Hiſtory of the Stone converted into the Gout, and on the contrary of the Gout into the Stone. A very Learned and Pious Man of this Nation, and alſo the glory of Learned Men Dr. *H. H.* after he had lived for many years, grievouſly obnoxious to frequent fits of pains, of Vomiting, and a making of bloody Urine, at length by the conſtant uſe of the following Remedies, he lived above ſeven years almoſt free from the *Stone*, and without any grievous Fit. The method of Cure which had been taught him by a certain Gentleman, was after this manner, without any *Phyſick* or medicine, abſtaining from Wine and Cyder, he drank for his ordinary drink ſmall Ale, made of Oaten Malt; further, once in a week in the Morning, he took a draught of the ſame Ale, to about a pint, with the Powder of ſmall old rotten Bones three ſpoonfuls diſſolved in it: By the uſe of theſe, within a few months he ſeemed to be in health, and freed from the *Stone*, but ſhortly after he began to be ſick of the *Gout*, and was infeſted with moſt grievous Fits of it, all the time he was free from the *Stone*; and at length upon every light occaſion, was become ſo obnoxious to them, that preſently after feeding, if he exerciſed either his body or mind, by walking or ſtudy, he moſt certainly expected the Fits of his pains. The reaſon of which was, becauſe the Blood being filled to a plenitude with *Saline* fixed Particles, and the nervous Liquor ſtill with *Acetous*, when being incited, and alſo poured forth on the freſh nutritious juice, they grew turgid, preſently they depoſed their ſuperfluities, *viz.* the Morbific matter of either kind, into the very weak Joints.

This venerable perſon therefore, being tyred out with ſo frequent and almoſt continual torture, by the counſel of a certain Friend, drank every morning of his own Urine, by the uſe of which, within a month or two, he was leſs tormented with the *goutiſh* Fits, but with an evil turn, the Diſtemper of the Stone began to grow again upon him, for he was from thence troubled with a pain about his Loins, with Vomiting, and a pain in making water, and a little after a total ſuppreſſion of Urine followed, which being not to be helped by any Remedies, in about a fortnights time this Reverend Gentleman dyed.

The reaſon of this ſhewed by Anatomical Obſervation. The Carcaſe being opened, all the *Viſcera*, except the Reins appeared moſt ſound and firm, but the right Kidney was almoſt conſumed, a ſmall heap of the *Glandula*'s being only left, all the Veſſels and the *Ureter* being joined together, and wholly ſhut up,

ſo that no Urine at all had paſſed there of a long time: The left Kidney being large enough, contained within the cavity and its paſſages, a great heap of Sand or Gravel, and little Stones; beſides there was a round hard and whitiſh ſtone fallen into the *Ureter*, three inches deep, and there fixed, and had wholly ſhut out the paſſage of the water; the *Membrane* of the *Ureter*, where the Stone ſtuck, was become ſo thick and callous, and ſo free from pain, that here it could by no means be moved either upwards or downwards.

It ſeems in this caſe, that when the coagulated Particles of the Blood and nervous juice, to wit, the *Saline fixed* and the *Acetous*, meeting together at firſt in the Reins, did ſtir up for a while the Diſtemper of the *Stone*; afterwards, by the uſe of the above-ſaid Powder, the *ſaline* Particles being ſtill thruſt forward into the habit of the Body, and not eaſily rendred, heaped together the *Gouti∫h* ſeed-plot in the Joints, the Reins being in the mean time free. But at length, when by the drinking of his own Urine, the *ſaline* Mine was brought back into the Reins, the Diſeaſe of the *Gout* was changed into the mortal Diſeaſe of the *Stone*.

CHAP. XV.

Of the Colick Paſſion.

Why the Colick is counted among the Diſtempers of the Brain, and the nervous Stock.

IT has been mentioned in the former Chapter, by what right we have referred this Diſeaſe among the Diſtempers of the Brain and nervous Stock, to wit, both in reſpect of the *Symptoms* urging, which are pain, and Convulſive motions, as alſo from the reaſon of the cauſe, by *Charles Piſo* placed in the head, and truly not improbably.

From whence the denomination.

Concerning the word *Colick*, from the *Inteſtine* called the *Colon*, we ſhall not ſtrive, for that it is ſuppoſed, though wrongfully, to be chiefly affected in this Diſeaſe. The Diſtemper may be deſcribed, That it is an hauling or notable pulling of ſome parts of the *Abdomen* or the Belly; from whence a very acute pain ariſes, and with it for the moſt part, a Vomiting, as alſo Convulſions, and Contractions almoſt of the whole *Viſcera* of the Belly, are wont to be joined. And for that the Navil, and its neighbouring parts, are ſometimes as it were with a Perforation, or boring thorow, drawn inwards, and ſometimes ſwell out, with an inflation or blowing up, and as it were with a great leaping forth; the *Inteſtines*, by an inverſe motion of the Fibres, are oftentimes pulled together upwards: wherefore the Belly being extreamly bound together, renders little or nothing; yea although it be often provoked by Clyſters, it doth not eaſily part with its contents: It appears clearly, that the Ventricle, with the *Duodenum*, and the bladder of *Gall*, are in like manner pulled, by Vomiting, and by the caſting forth of great plenty of yellow or green *Choler*: Sometimes the *Ureters*, and the bladder of the Urine, are ſo contracted, that in all the fit, the Urine is wholly ſuppreſſed, or but very ſparingly rendered: Beſides, a *Vertiginous* Diſtemper of the Head, frequently preceeds, or follows the fits of this Diſeaſe: yea, the *Colick* growing worſe, and inveterate, oftentimes cauſes pains in the outward members, and at length ends in the *Palſie*: Therefore, foraſmuch as very many parts are wont to labour in this Diſeaſe, we ſhall inquire, which is primarily affected, and by what means the other ſuffer; then what is the conjunct cauſe of the Diſeaſe, in what place it ſubſiſts, and from whence it draws its original.

A deſcription of the Diſeaſe.

The ſeat of the Diſeaſe is not always, or often in the Inteſtine, or Gut Colon.

As to the part primarily or firſt of all diſtemper'd, though the Diſeaſe being urgent, the whole region of the Belly is wont to be diſturbed, yet its primary ſeat ought to be placed, where the pain chiefly infeſts, and pertinaciouſly ſticks: But this, by the conſent of very many *Phyſicians*, is ſaid to be ſome where in the Gut *Colon*. Wherefore *Celſus* ſaith, *That the Colick is a Diſtemper of the greater Inteſtine*; which alſo reaſon ſeems to perſwade, ſomething; for whether the *Morbific* Matter is ſuppoſed to be heaped up in the Cavities of the Inteſtines, or to be wholly fixed in their Membranes, certainly there are extant deep little Cells in the folds of the *Colon*, for its receptacles, and thick coats of this *Inteſtine*, in which the peccant humor may be deeply faſtned. But indeed this opinion (to which we cannot eaſily aſſent) as alſo the denomination of the Diſtemper, ſeems to have grown in credit in the Schools of the *Phyſicians*, from this only, becauſe we ordinarily obſerve, that the *Inteſtines* enter into pains and torments, being irritated by wind, medicines, *Choler*, and perhaps other humors, contained within their cavities;

viz. neither in its Cavity or Coats.

hence, as it is obvious, may be inferred, that the *Colick* pains do ariſe from the ſharp and provocative contents of the *Inteſtines*, and eſpecially of the *Colon*. But if it were ſo, without doubt, thoſe things which looſen the Belly, and draw forth plentifully the wind, and the dregs or *Faces*, ſhould give certain eaſe; the contrary of which often happens, to wit, by ſome more violent, or often Purging, the Diſeaſe has grown worſe.

Pains commonly taken for Colicks.

Wherefore, that the ſeat of this Diſeaſe, and the nature of it may be truly known, we ought firſt of all to diſtinguiſh here, concerning the torments of the Belly, or pains commonly eſteemed for *Colicks*: to wit, theſe are either meerly occaſional, ariſing from a ſolitary evident cauſe, and ordinarily happen without any previous diſpoſition to ſome men, and eſpecially to thoſe who being of a tender conſtitution, have very ſenſible Fibres, and Spirits quickly diſſipated; after this manner, diſagreeable or unwonted eating or drinking, alſo medicines, taking of cold, and many other alterations about the ſix *non-naturals*, oftentimes excite great perturbations, with pains in the *Viſcera* of the lower part of the Belly: which kind of Diſtemper, ought to be eſteemed, not the Diſeaſe, but only *Symptoms* excited from a manifeſt cauſe.

Theſe are merely accidental or habitual.

Theſe latter are properly the Diſeaſe.

But beſides, the *Colick* properly ſo called, happens to ſome, not only produced by an accidental cauſe, but falling upon ſome men prediſpoſed by a peculiar right, depends wholly upon a foregoing cauſe ripened by degrees. The more grievous fits of this Diſeaſe, for the moſt part, have their periods, and obſerve the changes of the Air and Year; further, being excited, they do not eaſily give place to any Remedies, nor quickly paſs over; but notwithſtanding the uſe of Fomentations, and though the Belly be taken down very much by *Clyſters*, or Purging, they oftentimes continue with great fierceneſs for many days, and ſometimes weeks. The pains in every fit ſtill repeat the ſame part, and are followed with a concourſe, for the moſt part, of other the like *Symptoms*: But the pains of the *Colick*, though they have not the ſame ſeat in all, but ſometimes exerciſe their cruelties under the *Ventricle*, ſometimes about the *Navel*, or the *Hypochondria*, and ſometimes in the lower part of the Belly, or about the Loins; yet as often as they are repeated in the ſame ſick perſon, they moſtly obſerve the ſame neſt.

The conjunct cauſe of the Diſeaſe are not the Contents of the Inteſtines.

For the unfolding the *Ætiology* of this Diſeaſe, it is not enough to affirm, that the Inteſtines are pulled, either by their ſharp contents, or irritated by the Blood, and other humors poured into them, and breaking the continuity. For as to the former, it is extreamly improbable, that the *Bile*, or *Choler*, or *Phlegm*, or the *Pancreatick* Juice, or any other ſimple humor, or growing hot or fermenting with others, ſhould be able to excite ſuch fixed, cruel, and long continuing pains: Beſides, becauſe the *Inteſtines* being beſmeared with their own dung, cannot be eaſily pricked by the Contents, though ſharp; nor are they wont to be exaſperated by them; inſomuch that the ſharpeſt ſtools, which oftentimes fetch off the skin at the Fundament, very little trouble, or not at all, the paſſages of the Guts; further, theſe being grievouſly provoked, whatever is troubleſome, contained in their cavity, is eaſily ſhaken forth, and either by driving it forward, upwards, or downwards, is quickly thruſt forth; as is plainly perceived in the Diſeaſe of the *Choler*, and other *Dyſentrick* Diſtempers; nor indeed is there almoſt any loading of theſe provoking the Membranes, and ſtirring up pains, which may not be exterminated or carried forth of doors by one purge or other. Then, ſecondly, as to what reſpects the ſuffuſions of the Blood, or *Serum*, within the coats of the *Inteſtines*, by which an Inflammation or painful Tumors are excited; Indeed we grant, that ſometimes it may ſo come to paſs, yea I have known it by ocular inſpection; but from thence we have obſerved, not the *Colick* but the *Iliack* paſſion to have been excited. For when I have opened ſeveral dying of the *Iliack* paſſion, I found almoſt in all, that the cauſe of the Diſeaſe, and of their Death, was an Inflammation or Ulcer of ſome Inteſtine; neither is this any wonder, becauſe a *Solution* of the continuity, in a very tender and highly ſenſible Membrance, doth ſtir up Convulſions, and painful Corrugations or wrinklings together, and ſo continual and cruel; that therefore the *Periſtaltick* motion of the diſtempered Inteſtine, whereby the dung or dregs of the Belly are carried forward toward the *Anum* or Arſe-Gut, ſhould be hindred and wholly inverted.

Not the humors impacted in the Membranes.

The nervous Liquor ſeems moſt of all to contribute to the cauſe of this Diſeaſe.

Therefore, that we may thorowly inquire out both the Matter and Mine, as alſo the ſeats, and the ways of flowing to them, of this Diſeaſe of the *Colick*, by ſome other means; it may deſervedly be ſuſpected, that it is the nervous Juice, and its Recruments; and that the rather, becauſe this paſſion hath ſo intimate an agreement or conſent with the other Diſtempers of the Brain and the nervous Stock, as we have already ſhewed. *Charles Piſo* hath affirmed, That as moſt diſtempers of the whole Body, ſo alſo the pains of the *Colick*, are excited by a *Serous* heap or deluge gathered together in the head; and he contends, that the ſeat of this Diſeaſe, is neither in the coats nor cavities of the *Inteſtines*, but in the *Peritonæum* or inner rim of the Belly, and

that

that the cauſe ſticks wholly in the Brain, near the original of the Nerves. To wit, he ſuppoſes, (which he ſaith he hath found by *Anatomical* obſervation) "The ſerolities "laid up in the hinder region of the Brain, to beſet the little heads of the Nerves of "the wandring pair, and ſo ſome of the utmoſt branches and ſhoots of them inſerted in- "to the *Peritonæum* or inner rim of the Belly by the Caul, to move into Convulſions; "and from the contraction or drawing together of this, moſt cruel pains, both in it, "and in the underlying *Viſcera*, as it were breaking them to pieces, to be excited. For the proof of this opinion, he brings an example of a certain man diſſected, being dead of a moſt grievous fit of the *Colick*, in whom *the hinder region of the head near the Cerebel, was ſo much drowned with a clear water, as alſo the nervous original of the wandring pair, that the marrowy ſubſtance appeared very much moiſtened, like wet Paper*, Sect. 4. Chap. 2.

Charles Piſo's Opinion cited;

But indeed, though we ſhould grant, that the *Colick* ſhould ariſe from the humor of the Brain, and from the default of that watering the nervous parts; yet we think that this painful paſſion is excited, not after that manner as this *Author* has laid down. Becauſe we think neither the ſeat of this Diſeaſe to ſubſiſt in the *Peritonæum*, nor its primary cauſe to be within the head. For as to this, although the *Morbifick* matter being heaped up in the head, near the origine of the Nerves, doth ſometimes produce in the parts at a great diſtance, Numneſſes, Cramps, and Convulſive motions, as we have elſewhere ſhewn, by many inſtances, with the reaſons of the Diſtemper; yet it is much otherwiſe in a very cruel pain, ſuch as the *Colick* is wont to be: For as to this being excited, which always proceeds from a breach of the continuity, it is required, that the doloriſick cauſe or improportionate object, ſhould be fixed in the diſtemper'd member it ſelf, or at leaſt a certain part or portion of it: Neither is it ſufficient to ſay, that the Convulſion proceeds from a remote cauſe, and ſo the pain from the Convulſions: For although pain oftentimes doth produce Convulſive motions, yet theſe do not produce pain of themſelves, at leaſt great and continuing long. Wherefore in the pain of the *Colick*, the matter drawing aſunder the ſenſitive Fibres, and pulling them one from another, and ſo provoking them into painful Corrugations or wrinklings, doth not ſtill ſtay in the Brain; but deſcending from thence, thorow the nervous paſſages, towards the *Inteſtines*, ſeems to be heaped up ſomewhere in their neighbourhood, nigh to the pained parts, and there either growing turgid or ſwelling up, by reaſon of their fulneſs, or growing hot with ſome other humor, do bring in the fits of this Diſeaſe.

and examined.

The ſeat of the Morbifick Matter not in the Brain.

We indeed reject the Mine of the *Colick*, from the *Peritonæum*; becauſe this Membrane being very thin, and gifted but with very few and only ſmall Veſſels, is neither capable of any great affluxions of Humors, neither can it ſelf, though pulled together, be able to urge the *Viſcera* lying under it, into pains, by compreſſing or drawing them together. But the Morbific matter being ſlid down from the Head, by the Nerves, into the Belly, finds very convenient neſts in the *Meſentery*; in which very many and great Nerves have there their noted infoldings and diſtributions: Wherefore, as this part is very ſenſible, and very much obnoxious to the flowings in of the humors of the nervous Stock, it may be deſervedly affirmed to be the ſeat of this Diſeaſe of the *Colick*.

The part primarily affected in the Abdomen, not in the Peritonæum.

But more rightly it ſeems to be the Meſentery.

We have ſhewn formerly, the cauſes of ſome Convulſive motions in the *Abdomen*, which are commonly called *Hyſterical*, to lye hid in the *Meſenterick* Infoldings; moreover, in the ſame places, we did then aſſert, That the *Colick* pains had ſometimes their neſts, and confirmed it ſufficiently by *Anatomical* obſervation. But the matter is ſomething diverſe, and not the ſame, that is wont to excite the ſo different Diſtempers of either, under the ſame roof. In the Paſſions called *Hyſterical*, we have largely declared in a former Treatiſe, That the Animal Spirits being burthened with an *Elaſtick Copula*, are let off, or as it were exploded one from another, and ſo the containing bodies are unwillingly forced into irregular or preternatural Motions. But in the pains of the *Colick*, the ſame Spirits, by reaſon of the matter troubleſome to them, and improportionate, being provoked, and ſo pulled and diſtracted one from another, do put the ſenſible Fibres into very troubleſome Corrugations, or wrinkling themſelves together: By what means this comes to paſs in the pains of the *Colick*, alſo what are the conjunct, and the foregoing cauſes of this Diſeaſe, and the reaſons of the *Symptoms*, we ſhall a little further explain.

where the ſeat of the Diſtempers called Hyſterical, often lyes hid.

Therefore we ſhall ſuppoſe, that for a Seed-plot or Mine of the *Colick* Diſtemper, ſome Recrements of the nervous humor being fallen from the Brain, thorow the Nerves, and ſlid down into the *Meſentery*, and other infoldings of the *Abdomen*, are there heaped up; which if they be thick, and very viſcous, ſo that they cannot be received by the *Lymphæducts* or water-carriers, and ſo ſent away, or that they cannot ſweat forth by the ſmall ſhoots of the Veſſels into the cavities of the *Inteſtines*, ſtagnating in thoſe parts, and being by degrees heaped together, do ariſe at length to a provocative

The Colick-mine is affirmed to be within the nervous, and other meſenterick infoldings of the Abdomen.

fullneſs; then this matter growing more degenerate by ſtanding, and becoming more infeſtous, grows turgid occaſionally, or of its own accord, or perhaps grows hot or ferments with a *Saline fixed* humor, poured forth thither, from the Blood, torments the ſhoots of the Nerves, and the nervous Fibres (of which the *Meſentery* hath an infinite number) with very troubleſome and painful Corrugations; which kind of Diſtemper of theſe, doth not plainly ceaſe, till the hot or Fermentative matter being ſhaken off, or preſſed forth into the cavities of the *Inteſtines*, is at length overcome.

From which, planted thereabouts, the Colick Symptoms are excited.

Further, foraſmuch as from the *Meſentery* and its Infoldings, nervous ſhoots and Fibres are moſt thickly put forth into the bottom of the Ventricle, the bladder of the *Gall*, the *Choledoch* paſſages, all the *Inteſtines*, and on every ſide almoſt into all the *Viſcera* of the whole *Abdomen*; therefore whilſt the *Colick* matter grows hot or ferments in its Mines, it there ſtirs up torments, and oftentimes moſt cruel pains; and together with them in many other Membranous parts Cramps, and Convulſive or painful Contractions, are every where excited. Hence, by reaſon of the *Meſentery* being primarily diſtemper'd, a moſt ſharp pain under the Navil ſhews it ſelf, like as if a ſtake were driven thorow it, or a wimble a boring it; then round about almoſt in the whole *Abdomen* or lower region of the Belly, by reaſon of the *Inteſtines* being variouſly drawn down, or backwards, in diverſe places together, wandring pains run about hither and thither; and by reaſon of the motions of the Fibres being diſturbed or inverted, both in theſe, and alſo in the urinary Veſſels, the Belly is almoſt always bound up, and ſometimes a ſuppreſſion of the Urine, or a rendring but a very little ſucceeds: yea alſo the *Duodenum*, the *Gall*-Bladder, with its paſſages, and the bottom of the Ventricle, being diſtemper'd with a *Spaſm* or Cramp, and their Fibres drawn upwards, from thence frequent Vomiting, with a copious caſting forth of yellow or green Choler, doth infeſt during the fit.

The yellow or green Bile or Choler, that is caſt forth by vomiting, in the Colick-Fits, is not the material cauſe of this Diſeaſe.

But ſome do contend that this *Bile* or Choler (which is ſometimes caſt forth as green as a Leek) is the material Cauſe of the Diſeaſe; and that abundance of it dropping or diſtilling forth into the *Viſcera*, doth excite the *Colick* pains in the *Inteſtines*. I ſay, that this humor about the beginning of the fit, is contained without any offence in the Bladder or bag of the Gall; but afterwards by reaſon of the Convulſions of the *Viſcera*, being from thence preſſed forth, and as it were drawn or ſtroked out into the Stomach, it is carried from the diſtemper'd Ventricle by Vomit; but there perhaps meeting with ſome other acid humor, it acquires a greeniſh colour, yea ſometimes a blackiſh (as we have ſometimes found by *Anatomical* obſervation.) And indeed, it appears clear from this, becauſe thoſe who are of a more cold temperament, and beget little *Choler*, when they are ſick of the *Colick*, caſt forth by Vomit little or nothing of the yellow or green *Bile*; and yet they are wont to be vexed with as cruel and ſharp pains as others.

Wherefore pains of the Loins often come upon the Colick pains.

In the fit of the *Colick*, to the pains of the Belly, moſt cruel pains, raging about the Loins, in the bottom of the back, are very often joined; which certainly cannot ariſe from the irritation of any *Inteſtine*. But it may be eaſily conceived, that theſe are excited from the Morbific cauſe implanted in the *Meſentery*; foraſmuch as ſome moſt noted Nerves, belonging to the Loins, enter into the greateſt nervous infolding of the *Meſentery*; hence not only painful Convulſions are delivered by conſent from one part to another; but beſides, it is probable, that ſome Recrements of the Back and Loins, are derived by this paſſage into the *Meſentery*; and in ſome meaſure, for this reaſon *Scorbutical* people are ſo very obnoxious to pains of the Belly, and to a Flux.

In what the foregoing cauſe of this Diſeaſe conſiſts.

Thus much concerning the nature and ſeat of the *Colick*, as alſo of its conjunct cauſe, and of the *Symptoms* of the ſame coming into act: As to what belongs to the foregoing cauſe, it conſiſts chiefly in theſe two things, to wit, firſt of all for that many Recrements are heaped together in the nervous Liquor; and ſecondly, becauſe they being chiefly received from the Nerves, deſtinated to the *Viſcera* of the lower Belly, and brought into the *Meſentery*, conſtitute the Morbid Mines there: 1. The former of theſe happens for the moſt part, from the fault and vice of the Brain; to wit, becauſe this admits together with the nervous liquor, *Heterogeneous* Particles, and infeſtous to the Animal Regiment within its borders; beſides alſo, for that it doth not ſend away preſently theſe and other ordinary Recrements by convenient ſinks: Wherefore, the incongruous matter, when it cannot be otherways carried from the Brain, it moſt eaſily ruſhes into the moſt open Nerves of the wandring pair. And for this Reaſon it is, that Women from every inordination of the Brain, frequently contract the diſpoſition called *Hyſterical*; to wit, becauſe the Recrements of the nervous Liquor, whether they are *Spaſmodick* or Convulſive, and *Elaſtick* or letting off, or painful, or provocative only, being more apt to be depoſed into the wandring pair, ſo ordinarily excite Convulſive *Symptoms*, like to the *Colick*. 2. Becauſe this matter running into the pair of the wandring Nerves, is laid up in the *Meſentery*, or in other Infoldings within the *Abdomen*; the reaſon is, that in

1. The nervous Liquor is in fault, becauſe the Morbifick Matter is gathered together in it.

2. The nerves of the wandring pair, and their meſenterick Infoldings, becauſe they receive into themſelves this matter.

theſe

theſe nervous Infoldings, many and large Nerves of the ſame conjugation are at laſt terminated: wherefore, if the Recrements of the nervous humor, ſubſiding here as it were upon its bottom, neither can be drawn back by any of the Veſſels, nor paſs into the cavities of the Inteſtines, there is a neceſſity that it muſt erect in this part its morbid neſts.

The evident cauſes of this Diſeaſe.

The evident cauſes are of a double kind, to wit, firſt, thoſe that do injury to the Brain and nervous ſtock, by cauſing a greater proviſion of the Morbific matter: or, ſecondly, thoſe which by agitating or ſhaking the Blood and humors, ſtir up the Mines gathered together, and before quiet, and provoke them into painful heats or fermentings. It would be tedious here to examine the manifold, and diverſe occaſions, by which the *Colick* pains are brought upon thoſe prediſpoſed; for theſe often are cauſed by great inordinations in the ſix *non naturals*, and the mutations of the Air, and the Year; and moreover (by what help ſhould be expected) by the untimely adminiſtring Medicines themſelves.

The differences of this Diſeaſe.

From what has been ſaid, the differences of this Diſeaſe may be eaſily known: For, firſt, by means of the cauſes, we have ſhewn the *Colick* to be either accidental, which is cauſed by reaſon of the *Inteſtines* being provoked by ſharp contents, ſuch as we but now deſcribed it. Secondly, By reaſon of the place affected, the *Colick* is ſometimes ſuperior, ſometimes inferior, ſometimes *lateral* or of the ſide, as the Morbific matter is fixed, either ſometimes in this part, ſometimes in that part of the *Meſentery*, or in other infoldings of the *Abdomen*. Thirdly, By reaſon of the ſickly condition and temperament of the ſick, it is called a *Bilous*, or *Cholerick*, a *Phlegmatick*, or a *Melancholick Colick*; alſo either ſimple, or *Scorbutick*; not that theſe imaginary humors excite of themſelves the *Colick*, but according to the diſpoſitions of the Body diſtemper'd, various *Symptoms* are made, or cauſed to vary.

Its Prognoſtick.

As to its *Prognoſtick*, it is commonly known, that the accidental *Colick*, to wit, excited from a ſolitary evident cauſe, is moſt often ſafe, and with an eaſie matter cured; but the habitual, as to its diſpoſition, it is very difficult to be rooted out, ſo that the fits may no more return; and its fits ſometimes are pertinacious, notwithſtanding Remedies, and ſometimes continue many days, yea weeks, and months.

2. The *Colick* diſpoſition frequently ſucceeds long intermitting Feavours, and continual, being evilly handled; for that the nervous Liquor being highly vitiated, gathers together many Recrements, which are deeply depoſed into the Infoldings of the *Abdomen*, as it were the more open receptacles. Further, for this reaſon, an *Epidemical* Feavour rages ſome years, to which the *Colick* is joined, as its *Pathognomonick* or peculiar *Symptom*: hence in like manner, a long and grievous *Scurvy* cauſes alſo the *Colick*, becauſe it perverts the nervous liquor.

3. After the *Colick* pains have raged for ſome time in the Belly, they fall oftentimes into the Loins, and then the Diſeaſe increaſing or growng worſe, they enter upon the members, and the muſcles almoſt all in the whole Body, and at length oftentimes end in the *Palſie*; which certainly is a manifeſt ſign, that the Morbific matter is not carried by the Arteries, but by the Nerves; and that its ſubject or ſeat, is not the cavities or the coats of the *Inteſtines*, but the nervous Infoldings of the *Meſentery*: For becauſe the *Lumbary* pains, or thoſe of the ſide, do come upon the torments of the Belly, beſides that the Nerves of either place communicate, the cauſe is further, for that the Morbific matter being much increaſed in the Head, ſlides down, not only into the wandring pair, but alſo into the *ſpinal* Marrow; and entring into it, and ſetling in its bottom, cauſes pains to ariſe in the Loins, and afterwards in many other Nerves, which proceed from the *Spine* or Back-bone, and in other Members and Muſcles diſtemper'd; laſtly, it brings in the *Palſie* by the paſſages of the Nerves being ſtuffed by the Morbific Matter heaped up to a plentitude in them.

4. The more cruel *Colick*, and very much raging, whoſe cauſe is an Inflammation, or an Impoſthum of ſome *Inteſtine*, for the moſt part induces the mortal *Iliack* Paſſion.

The Cure.

The *Curatory* method in the *Colick*, as in moſt intermitting Diſeaſes, ſuggeſts three primary *Indications*: The firſt of which *Curatory*, to be adminiſter'd in the fit, reſpects the allaying of the pains, and for the ſooner and more eaſie taking away the coming of the Diſeaſe. Secondly, *Preſervatory*, which ſhews the taking away the cauſe of the Diſeaſe without the fit, that the fits may not be often repeated, or more grievouſly infeſt. Thirdly, *Vital*, which ſupplies Remedies for the preſerving of ſtrength in the torments, and moſt cruel Cruciations, and for the cheriſhing of the Spirits. Concerning theſe we ſhall ſpeak a little more fully in order.

1. The firſt Indication Curatory.

1. We almoſt only reſpect the *Curatory Indication* in the accidental *Colick*; for the evident cauſe, which is an irritation of the *Inteſtines* by ſharp contents, being removed, the pains for the moſt part ceaſe of their own accord, nor do they return without the like

like occaſion.. Wherefore, for the quick curing of this Diſeaſe, the practice is well enough known to every common perſon, among the vulgar, to wit, preſently to adminiſter ſoftning *Clyſters*, *Topick Anodynes*, and *Narcoticks*; to which, if a Feavour be joined or feared, letting of blood is often uſed with ſucceſs. We ſhall ſet down forms of theſe, and the order of uſing them in the Cure of the habitual *Colick*.

What the chief Medical intentions are in the Fit.

Therefore, for the healing of this Diſtemper, in the fit, there are two chief *Intentions*; to wit, both to take away the painful breach or ſolution of the unity, and to allay the burning or growing hot of the Fibres, and the Spirits in them. For the former, you muſt endeavour, both that the matter impacted in one or more Mines, may be ſhaken off or ſubdued; and alſo, that a flowing in of new matter may be hindred. The ſecond *Intention*, which ought chiefly and continually to be inſiſted upon, is performed by *Anodynes* chiefly, and *Narcoticks*: After what manner, and by what Remedies, every one of theſe are methodically to be done, we ſhall now ſhew you.

For the moſt part clyſters are to be begun with,

Moſt often, the Cure of the pain of the *Colick*, and that rightly, is begun with a *Clyſter*. Let this at firſt be gentle, and only emollient, by which the Corrugations or the wrinklings of the Fibres may be allayed, and the burning Spirits flattered or pleaſed. For this end, warm Milk with Sugar, or *Moloſſus*, or Syrup of Violets, is convenient; as alſo Emollient Decoctions of Mallows, Marſh-mallows, Mercury, with the Flowers of Melilot, and Elder, with the Oyl of Almonds, or of Olives; alſo a Decoction of a Sheeps-head, or Calves-feet: ſometimes a *Clyſter* of mere Oyl of Olives, or of Linſeed Oyl, is wont to help before any others.

Which are at firſt to be gentle; afterwards more ſharp clyſters.

But if the more gentle *Clyſters* do not looſen the Belly, nor are eaſily ejected, there muſt be given ſuch as will more provoke, and preſs, or as it were ſtroke forth the humors, by the little mouths of the Arteries: For which end, let there be prepared *Carminative* Decoctions, or ſuch as expel wind, or bitter Decoctions; in which are diſſolved *Electuary Diacatholicon*, *Diaphœnicon*, or of *Laurel berries*, or *Species Hieræ*: Alſo to theſe Liquors it is uſual to add the Infuſion of *Crocus Metallorum* three or four ounces, or of the *Emollient* Decoction one pint: add of *Venice Treacle* diſſolved with the yolk of an Egg one ounce or an ounce and a half; or Take *of ſound Urine one pint, of Venice Turpentine diſſolved one ounce and a half, of Moloſſus one ounce*, mix them, and make a Clyſter. I have known this oftentimes to bring great help; the reaſon of which ſeems to be, for that the Balſamick Particles of the *Turpentine* comfort the *Inteſtines*; and beſides, being received by the Blood in the Veins, and with it circulated thorow the whole Body, moves the Urine, ſo that by ſuch a *Clyſter*, plenty of water follows, and always is rendred with a ſmell like Violets. Perhaps alſo, the Particles of the *Turpentine* being every where diffuſed, either move the ſtagnating Morbific matter, or incline the acetous, or otherways degenerate, to a better diſpoſition.

Fomentations.

Whilſt the *Inteſtines* are thus waſhed with *Clyſters*, and are cheriſhed within, Fomentations are likewiſe to be applied to the outer parts of the Belly. Take *of the leaves of both the Mallows, of Mercury, of Pellitory, each four handfuls; of the Flowers of Elder, Chamomil, and Melilot, each two handfuls: the head of a Sheep cut in pieces.* Let them be boiled in as much Spring-water as will ſuffice; ſtrain it, and uſe it for a Fomentation, with hot linnen ſtuphes dipt in it, and wrung forth, and ſhifting them apply them by turns. Repeating them as often as the more ſtrong pains do come upon them: In the intervals, *Pulteſſes* or *Oyntments* may be adminiſter'd.

Pulteſſes.

Make a Pulteſs of bruiſed Herbs, adding to it of oaten meal what will ſuffice; which may be laid to the belly, covering it with little ſquare bags made for that purpoſe. Let one of theſe at a time be made hot in a pan ſet over hot coals, with the Oyl of Earth-worms, or of Frogs; lay them on warm, ſhifting them as ſoon as one grows cold.

An Oyntment.

Or Take *of the Oyl of Earth-worms or of Frogs what will ſuffice; and anoint the pained part, after the Fomentation, and lay upon it a thin ſheet of fine brown paper dipt in it.*

The Caul of a Lamb, or the Lungs, or the Inwards of any other Beaſt, being laid warm to the Belly, and ſo ſhifted, ſometimes wonderfully eaſes the pain.

Cold Fomentations.

I have obſerved in ſome Conſtitutions and temperaments, that *Fomentations* or Bathings made of hot things, and applied hot, have rather made the pains worſe than eaſed them: wherefore in theſe caſes, it will ſeem good to preſcribe Fomentations of the ſolutions of *Nitre*, or of *Sal Armoniack*, or other *Chymical* Liquors, as in the pains of the *Gout*, and ſometimes (as *Septalius* ſays) of pure cold water.

But if the torments of the Belly do not remit by the uſe of theſe, *Hypnoticks* muſt be uſed; which being given in a juſt Doſe, oftentimes give great truces: In the mean time, that the tired Spirits may be refreſhed, and ſtrength preſerved, there muſt be yet inſtituted a farther proviſion againſt the Diſeaſe.

Take

Take *of liquid Laudanum Tartariſated, from ſixteen drops to twenty, let it be given going to ſleep, in a ſpoonful of the water of Chamomil flowers, drinking after it ſix ſpoonfuls of the ſame water: Let it be repeated every other, or every third night, if the pains be very great.* *Opiates.*
In a more hot Conſtitution, Take *of the water of Chamomil flowers three ounces, of the Syrup of Poppies half an ounce, of Aqua mirabilis two drams; make a draught, to be taken at the hour of Sleep.*

In the mean time, whilſt theſe things are doing, for the allaying the pains, evacuating Remedies have their turns, for the diſcuſſing, or at leaſt for the looſning the matter impacted in the morbid neſts; to wit, that both the *Colick* Mine may be wholly extirpated; and alſo that the ſupplements or its cheriſhment be cut off, that they may not more increaſe. For theſe ends a *Vomit* (where it is convenient) and a gentle purging, ought to be ordered; and alſo in an hot temperament, where there is a Feavour, or where it is feared, letting of Blood. *Evacuating Medicines.* *Vomiting Medicines.*

Take *of the Sulphur of Antimony, from five grains to ſeven or eight, of the Conſerves of Borrage one Dram; let it be given in the Morning with government.* In this caſe may be given, according to the judgment of the *Phyſician* preſent, either an Infuſion of *Crocus Metallorum*, or of *Mercurius Vitæ*: The *Emetick Tartar* of *Mynſicht*, the expreſſion of the leaves of *Aſarum*: and in more tender Conſtitutions, Salt of *Vitriol*, and Wine and *Oxymel* of *Squills*.

Purges muſt be given only in a ſmall Doſe, and ſuch as are choice, leſt they move a nauſeouſneſs in the ſtomach of the ſick. *Purges.*

Take *of the Reſine of Jalap, of Scammony, each five grains, of the Cream of Tartar one ſcruple, of Cinnamon powdered four grains; make a Powder, or let it be reduced into Pills, or into a Bolus, with the Conſerves of the Flowers of Borrage, or Damask Roſes.*
Take *of Scammony ſulphurated half a ſcruple, of the Cream of Tartar fifteen grains, of Diaphoretick Antimony one ſcruple; make a Powder, and let it be given after the ſame manner.*

If there be not a Feavour, a Doſe of Stomach *Pills cum Gummi* may be given, or of *Amber* by it ſelf, or with the *Reſine* of *Jalap*.

Take *of Pill. Rudii twenty five Grains, or half a dram, of Laudanum one grain; make four Pills, let them be taken at the hour of reſt:* Theſe at firſt cauſe ſleep, and Purge in the morning. Or, Take *of Calomelanos one ſcruple, of the Reſine of Jalap ſix grains, of Scammony four grains, of Ammoniacum what will ſuffice; make four Pills to be taken going to reſt.* *Salivation.*

In a long and tedious *Colick*, when all other Remedies help little or nothing, I have often known this Medicine, being once or twice given, to have moved *Salivation*, with the greateſt eaſe to the ſick. For when the morbific matter, being heaped together, and thorowly impacted in the nervous Infoldings, and other places about the *Abdomen*, could not be moved by any other Medicines; the *Mercurial* Particles every way unfolding themſelves, eaſily diſſolve it, and divide it into ſmall bits, and drive it up and down hither and thither, and at length wholly diſſipate it. Wherefore in a long and pertinacious *Colick*, a gentle *Salivation* ſometimes may be very happily adminiſter'd.

Baths, and *Sweating* Medicines, are ordinarily wont to be preſcribed in the pains of the *Colick*; but as to our obſervation, very rarely with ſucceſs: For that theſe, by ſhaking the Blood and nervous humor, cauſe them to lay up ſtill more matter into the *Colick* Mine, yea and that matter there depoſited, to grow more hot and raging, and very rarely wholly ſhake it off. *Baths.*

Diureticks are wont much more profitably to be given, by which when the Blood is poured forth, and its ſeroſities plentifully precipitated, the nouriſhment of the Diſeaſe is cut off, and the bloody Maſs being emptied, receives part of the Morbific matter, ſo that its reliques are more eaſily ſhaken off. For this end, *Diureticks.*

Take *of the beſt Spirit of Tartar rectified half an ounce; let half a dram be given twice or thrice in a day, in a ſpoonful or two of the following Julep, drinking after it five ſpoonfuls of the ſame.*
Take *of the Water of the leaves of Burdock, or of Aron, or of Arſmart, one pint; of the Water of the flowers of Elder and of Chamomil, each four ounces; of the compound water of Gentian, of the compound Water of Raddiſhes, each two ounces, of Sugar ſix drams; mix them together.*

After

After the same manner as the *Spirit* of *Tartar*, may be given in a just Dose, sometimes the *Tincture* of the *Salt* of *Tartar*, sometimes the simple mixture, or the Spirit of *Sal Armoniack* succinated, or impregnated with *Amber*.

Take *of Millepedes prepared two drams, of the flowers of Sal Armoniack Tartarized one dram, of the Oyl of Nutmegs half a scruple, of Turpentine what will suffice; make a Mass, and let it be made into Pills; take three or four once or twice in a day, drinking after it a Dose of the Julep, or of the following distilled water five or six spoonfuls.*

Take *of fresh Millepedes or Hog-Lice cleansed one pint and a half, the outer rind of six Oranges, and of four Lemons, six Nutmegs; let them be cut small, and add to them one pound of the crumbs of stale white Bread: all being bruised together and well mixed, pour to them four pints of new Milk, and of Sack one quart; let them be distilled according to art, and the whole liquor mixed together; you may sweeten it with Sugar, or the Syrup of Violets as you please.*

Mineral Purging Waters. In a long and pertinacious *Colick*, to those who are of a more cold temperament and *Viscera*, Purging *Spaw* Waters, or Whey with the Syrup of Violets, are wont to be given oftentimes with great help; for both liquors, where they are agreeable, being plentifully drunk, refrigerate the stomach and the hot Intestines, and presently loosen and help them in their painful Cramps and wrinklings, or from the Convulsive winds or blasts that extend them; besides, they chiefly help (as I suppose) for that they tame and subdue the *Saline* Particles of another nature, insinuating themselves into the Morbific Mine, and other *Saline* and irritative Particles inhabiting it, and oftentimes carry them forth by Purging.

In this Disease, as all things are not convenient for all men, yea neither the same thing always for the same person, there is dayly need of the careful observation of a prudent *Physician*, that by the co-indications from things taken, that hurt or help, a right method of healing may be instituted, and varied as occasion serves.

2. The Vital Indication suggests Remedies. 2. The *Vital Indication* ought to be joyned to the *Curatory*, and that between whiles. For when the sick, being afflicted with torture, watching, Vomiting, and abstinence almost continual, often fall into languishment, and sometimes in danger of their lives; Remedies which sustain strength, refresh the Spirits, and procure some truces against the fierceness of the Disease, to wit, *Cardiacks* or *Cordials*, and *Hypnoticks* or such as cause rest, have here their turns.

Cardiack. Take *of the Water of the flowers of Chamomil, and of Elder, each four ounces; of Barlyed Cinnamon, and of the whole Citron, each two ounces; of Pearl powdered one dram, of Sugar three drams; make a Julep, take of it five or six spoonfuls.*

Take *of the Powder of Pearl, and of Crabs Eyes, each one dram; let it be divided into four parts; let one part be given twice or thrice in a day, with the Julep, or with a Decoction of the roots of Contrayerva.*

Take *of the Conserve of Clove-Gilliflowers one ounce, of the Confection de Hyacintho, of Alchermes, each two drams; of Pearl powdered half a dram, of the Syrup of the juice of Citrons what will suffice; make a Confection, give of it the quantity of a Nutmeg, three or four times in a day with the Julep.*

In less hot Constitutions, *Spirits* of *Hartshorn*, of *Sut*, of *Sal Armoniack* impregnated with *Amber*, also the *Tincture* of *Antimony*, or of *Coral*, do oftentimes give notable help.

Hypnoticks. *Opiates* are of necessary use in the Disease of the *Colick*, without which, the sick cannot live, nor the *Physicians*, nor those who attend them be at quiet, or have any leasure time. Take *of the water of Cowslip flowers three ounces, of the Syrup of Poppies half an ounce, of Aqua Mirabilis two drams; mix them and make a draught to be given going to sleep.*

If the pains be very strong, and yield to no such Remedy, prepared *Opium* and its compositions ought to be given. The *Laudanum* of *Paracelsus*, or the *London Laudanum*, Pills of *Styrax*, or of *Hounds-tongue* are convenient; a Solution of *Tartarisated Opium* from sixteen to twenty grains is much used by me. Which Medicine indeed I have given with very good success, to some, that for a long time have been miserably vexed with this Disease, sometimes a great while every night or every other night.

3 The Preservatory Indication, by which are indicated, 3. The *Preservatory Indication* hath only place in the intervals of the fits, and endeavours the taking away the present foregoing cause of the Disease, and hindring it for the future, so that the fits of the pains may seldom or never afterwards return: For which end, the Blood and the nervous liquor ought to be purified, lest they should beget the morbific matter, and conserved in its due temper, and the Brain and the nervous In-

foldings

foldings of the *Abdomen* corroborated, leſt they ſhould too readily receive it. For theſe ends, a ſtrict dyet being ordered, let them enter into a courſe of *Phyſick* Spring and Fall; ſuch as we preſcribed for the prevention of the *Gout*.

Vomiting in this caſe is never to be omitted, if it be agreeable, to wit, by which the Emunctories of the *Viſcera* being emptied, the Recrements of the Blood, and the nervous Liquor, which otherwiſe would augment the morbific matter, may be received more plentifully; beſides the nervous Infoldings, and all the parts are ſo ſhaken, that nothing of that which is about to go into the Mine of the Diſeaſe, is ſuffered to ſtagnate or to be heaped up there. *Vomiting.*

Let Purging for three or four times, with due intervals, and alſo in a hot Conſtitution, *Phlebotomy* be celebrated; moreover, let altering Remedies, and eſpecially *Chalybeats*, or ſuch as are made out of Steel, when they do not Purge, be daily taken at medical hours. *Purging.*

But before all other Remedies whatſoever, the drinking of Mineral Waters, ſuch as come from Iron, for a month, in the Summer time, is wont to give the greateſt help: But when theſe are drunk, you muſt take heed, that they be rendred well and quickly by Urine or Stool, leſt if they ſhould chance to ſtay long in the body, by running into the Head or Feet, (as they often do) they ſhould cauſe a *Vertigo* or the *Gout*. *Altering Remedies.*

Take *of our Tincture of Steel one ounce, and let fifteen to twenty drops be taken twice in a day in ſeven ſpoonfuls of the following Julep.*

Take *of the Waters of the leaves of Aron, and of Burdock, each half a pound; of the Magiſterial of Earth Worms, of Gentian compound, of Pœony compound, each two ounces; of Sugar half an ounce; mix them.*

After the ſame manner, here deſervedly have place the Tincture of *Antimony*, and of *Amber*, yea and many other altering Remedies above preſcribed for the Diſtempers of the Head, may alſo be uſed for the preſervation from the *Colick*, whoſe foregoing cauſe proceeds from the Brain.

As to *Charles Piſo*'s Obſervation, by which he endeavours to prove, that the cauſe of the pain of the *Colick* remains wholly in the Brain, becauſe he had found a *Serous* deluge in the Head of a certain perſon dead of that Diſeaſe: I ſay, that this *Serum* being heaped up in the head, was the remote and antecedent cauſe of this Diſeaſe, and not the conjunct cauſe. But indeed it is probable, that from this firſt ſpring a certain portion of this ſuperfluous and ſharp Serum did deſcend, by the nervous paſſage, into the nervous Infoldings of the *Abdomen*, and there conſtitute the Mines of the *Colick* Diſtemper. Further, although the Morbific matter there ſliden down, becauſe of the tenuity of the parts, and the ſmallneſs of the neſts, can rarely be ſeen with the eyes, yet I have plainly ſeen and handled ſuch a Mine of this Diſeaſe become inveterate and very cruel, not long ſince, in the *Meſentery*, opening the dead body of a certain Gentlewoman, of whom I have elſewhere made mention. *The Objection of Charles Piſo ſolved.*

Being ſometimes ſince conſulted with, concerning the curing of a Reverend old Man, grievouſly obnoxious for many years to the Diſeaſe of the Colick; I adminiſter'd to him the ſame method of healing, and the Remedies I but now deſcribed; by the uſe of which, he found himſelf much better after a month or two, and within half a year he ſeem'd to be perfectly well, ſo that he lived afterwards wholly freed from any fits of the pains: But the *Colick* diſpoſition had not long ceaſed, and he had omitted the uſual courſe of Medicine, but he ſuffer'd about his throat a reſolution or looſning in the Muſcles ſerving for ſwallowing, which troubled him oftentimes, ſo that he was in danger to be choaked by Food, and chiefly by liquid things ſticking in that place. Againſt this evil receiving help by *Antiparalytick* Remedies, he continued from thence ſix or ſeven years in moderate health; at laſt, being taken, the firſt time in the midſt of a journey with an *Apoplexy*, he dyed. It is obvious enough in this caſe, that the Recrements of the nervous liquor, that were wont to be depoſed about the nervous Infoldings of the *Abdomen*, did at firſt ſtir up the Diſtemper of the *Colick*; then the ſame being ſhut forth from that part, getting another neſt for themſelves about the *Ganglioform* nervous Infoldings of the Throat, brought in the reſolution or ſhort Palſie of the *Oeſophagus*; and laſtly, by reaſon of the ſame matter reſtagnating in too great a plenty in the middle part of the Brain, that deadly ſenſleſneſs followed. *The firſt Hiſtory.* *The Reaſon of it.*

A certain cunning and crafty little Lawyer, about fifty years of Age, was wont to be troubled for many years with a periodical Headach, and with a ſtupor or numneſs of his Senſes, and a great weight of his head; about the middle of Summer labouring very much with the aforeſaid Diſtempers, he perceived a ſudden eaſe from the applying of Topical Remedies; but a little after, he was taken with a very cruel *Colick*, then *The ſecond Hiſtory.*

being the first time; whose fit fell upon him with so much cruelty, that his strength suddenly failing, he fell into frequent swooning fits, with a cold sweat, which fit notwithstanding by leasure vanished within twenty four hours, without any breaking of wind, or going to Stool. But after that, he suffer'd frequent fits, and became obnoxious to the Disease; all which (as I was carefully informed) for the most part were usher'd in with a pain of the Head, with a *Vertigo*, and amazedness, or stupidity, and from hence he was wont to presage the pains of the *Colick* would very suddenly follow. In a certain fit, which lasted for twelve days with great cruelty, the sick person himself observed, and told me, that whilst the distemper troubled him in his Belly, he felt no trouble in his head, but the *Colick* pains remitting, presently the *Vertigo* returned, with the Headach: from which reciprocal translation of these *Symptoms*, from the Head into the Belly, and so on the contrary from the Belly to the Head, we may lawfully argue, that the same Morbific matter, flowing in the nervous Passages, falling down sometimes below, brought in the *Colick* Passion, and sometimes above; and restagnating, caused those distempers of the Head. Hither may be referred, what *Charles Piso* hath accurately observed concerning himself, being wont to be affected with *Cephalick* distempers, and the *Colick* pains by turns, and with a mutual dependency, *Sect.* 4. *C.* 2. *p.* 355.

The Reason of it.

The third History.

Not long since, a certain studious young Gentleman, and living a sedentary life, began to complain of a great stupidity of his senses, and a dulness, as also of a great weight of his Head, and almost continual sleepiness; further, his Ventricle or Stomach was become so slothful and stupid, that he wanted all manner of Appetite, whilst a Cure was instituted against this evil disposition, by Remedies which roused up the Spirits, and shook off their burthens, this Gentleman fell into a most cruel *Colick* Passion (which he was never obnoxious to before) from which a most cruel pain, like the boreing of an Auger, possessed the middle of the *Abdomen*, his Navil being drawn inwards, and notwithstanding the daily use of all kind of Remedies, it continued for three weeks, with great cruelty; that in the time he could take no rest, but what he received from *Narcoticks*, nor could he receive any ease from his pains, unless by an hot fomentation. Certainly in this case it is plain enough to every one, that the impurities of the nervous liquor being gathered to a certain fullness, was the immediate or conjunct cause of the whole sickness; which matter subsisting first in the Head, brought in the notable stupidity of the Brain and the oppression of the Animal Function; then being fallen down, by the passage of the Nerves, into the nervous Infoldings of the *Abdomen*, caused that cruel and daily *Colick*.

The Reason of it shew'd.

FINIS.

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